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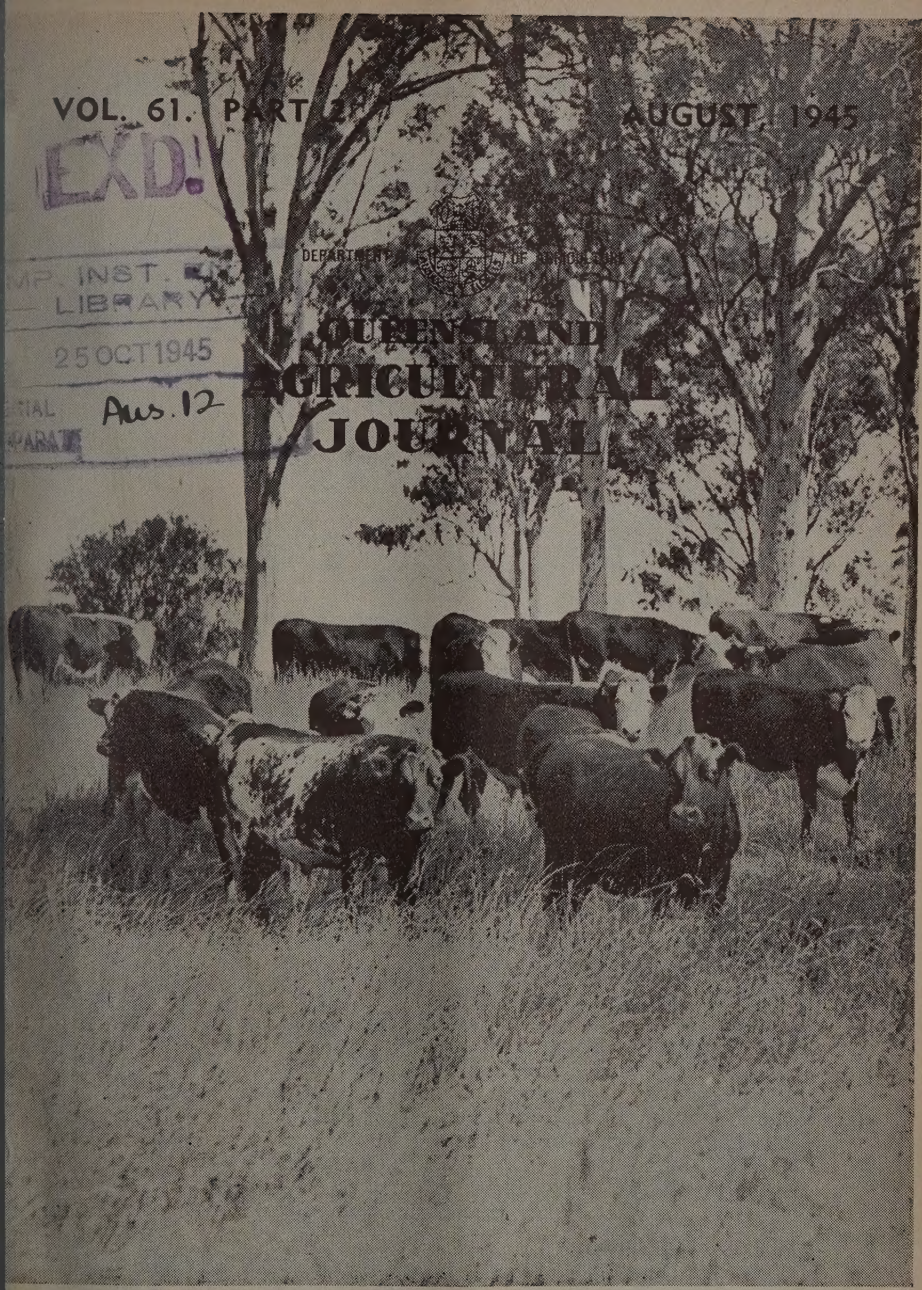

Beef on the Hoof, near Fernvale, Brisbane River Valley.

LEADING FEATURES

Establishing Grasses in Coastal Districts
Fertilizing Tomatoes
Principles of Biological Control
Organising for the Mules Operation
Balance in Dairy Farming
The Milking Machine
Bleeding Bail
Sanitation in Pig Raising

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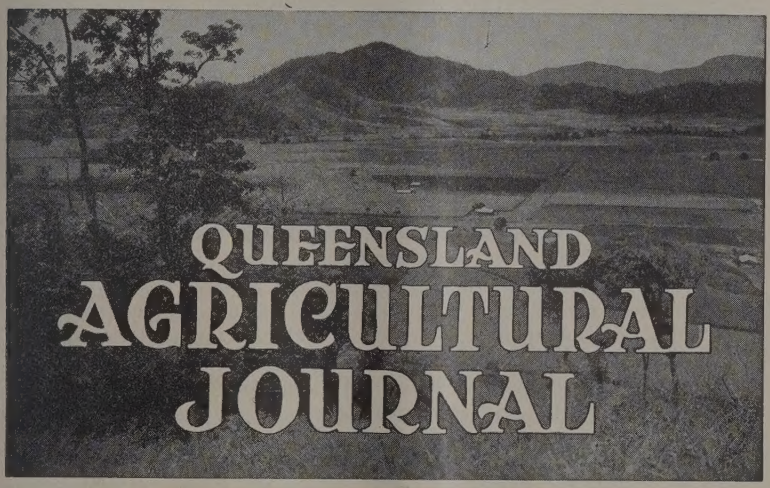


QUEENSLAND AGRICULTURAL JOURNAL

Volume 61 1 AUGUST, 1945 Part 2

Event and Comment.

The World Food Crisis.

THE food crisis in the world to-day remains one of the most baffling problems which the United Nations have to solve. The position is that because of increasing food requirements and a steep decline in world food production, there is not enough food to enable even the United Nations to have as much to eat in 1945 as they had in 1944.

While the difficulties with which Australian agriculture has been faced during the war years are fully appreciated, there is still the necessity of doing everything possible to increase essential food production in this country. More has to be done to increase our export of the commodities needed most. The long-term contracts already entered into with the United Kingdom provide an assured market at agreed prices for all the meat and dairy products we can send overseas until 1948, and there is a possibility that the term may be extended.

Emphasis is placed on the importance of maintaining an even flow of commodities to the markets offering. If the export of butter, say, from Australia to Britain is about a hundred thousand tons in one year and only half that quantity in the following year, we risk the loss of at least a proportion of the market and the goodwill which goes with it. Regularity of supply is the essence of sound marketing. It may be said, of course, that with primary products our output is governed by seasonal conditions; so it is, but that applies to every exporting country. It is obvious, however, that by maintaining continuity of supply in unvaried volume all concerned will benefit.

As for the market for animal products in Britain, the position is that notwithstanding the immense wartime development of rural industries in the Old Country, less meat and butter is being produced there

than before the war. So the market is still there for the Dominion producer who will supply it. That raises, naturally, the question of prices. There is no argument about the right of the primary producer to a fair return, but there is no blinking the fact that he has to compete with other primary producers throughout the world, and he has to compete very often against alternative products. Going on the old rule of business, prices have to be correlated with costs of production. Consideration has to be given, therefore, to the possibility of reducing production costs while still providing a good living for the producer by, say, getting more out of every acre in cultivation or by increasing the yield of milk per cow. It cannot be said that present price levels are too high, but it is possible to improve efficiency in production and that will be done, no doubt, when conditions again become normal.

Nutrition, which kept Britain fighting fit during the war even though the rations were light, will, it is believed, be a dominant influence on economic food policy in the future. Certainly, no country will be able to afford luxuries for some time, but it is most important that an essential food, such as butter, should never be classed as a luxury.

Australia has made and can continue to make a great contribution to the world's essential food needs, but to do so our farmers must have the necessary labour, equipment and other requirements for increased food production. The sooner all requirements are made available, the sooner we can contribute our quota to the weathering of the world food crisis.

Ex-Servicemen and the Land.

WITH soldier settlement, as with any other system of land settlement, it is important that the fundamentals of farming should be kept clearly in view. The basic factors in successful farming include good land in regions of sufficient rainfall, plenty of water for stock, accessibility to transport systems and facilities and to profitable markets.

Plans for returned soldier settlement are being developed in accordance with the following general principles:—

That land settlement of Servicemen should be undertaken only where economic prospects for the production concerned are reasonably sound; the number to be settled should be determined by settlement opportunities rather than by the number of applicants.

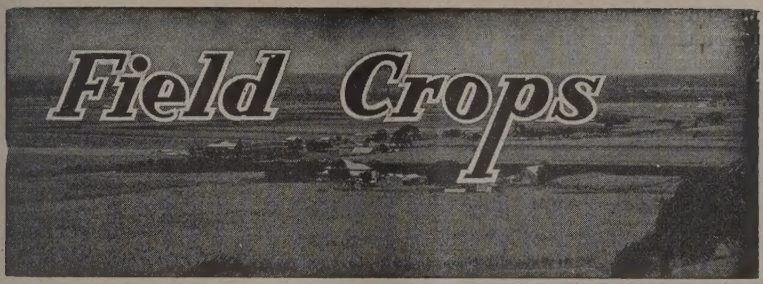
That Servicemen should not be assisted to become settlers unless a competent authority is satisfied as to their suitability, qualifications and experience.

That settlers should be allotted sufficient land to enable them to farm efficiently, and to earn a reasonable labour income.

That lack of capital should not preclude a Serviceman, otherwise suitable, from settlement.

That adequate guidance and technical advice should be available to settlers through agricultural extension services.

All members of the Defence Forces who have served for six months or more and who are honourably discharged will be eligible to apply for settlement on the land. Where training or additional experience are necessary, employment on approved farms will be arranged. If an ex-Serviceman is judged suitable for farming on his own account, he will be eligible to apply for a holding. Credits for the purchase of stock and equipment will be arranged on equitable terms.



Establishing Grasses in Coastal Districts.

C. W. WINDERS, Agrostologist.

DURING recent years coastal dairy farmers have been taking a keen interest in laying down paddocks of various grasses to act as supplements to paspalum paddocks. The grasses in greatest demand have been Kikuyu, elephant, Para, and types of Guinea grass, but many enquiries have also been received by Departmental advisory officers concerning the suitability of molasses grass, Urochloa or Liverseed grass, and African star grass for coastal conditions. Unfortunately, under wartime conditions supplies of planting material of some of these grasses have been difficult to obtain, since growers have not had the labour to collect cuttings, crowns or seeds, as the case may be. However, dairy farmers are sometimes able to procure sufficient of one or other of the grasses to plant a paddock, and the following notes on the various grasses and their establishment are given for their information.

Kikuyu Grass.

Many farmers who have been impressed with the aggressiveness of Kikuyu grass when growing under favourable conditions (Plate 28) are inclined to believe that weedy, run-down paspalum paddocks can be converted to useful pasture paddocks simply by ploughing out the old grass and planting Kikuyu grass. A vigorous pasture of Kikuyu grass certainly is seldom invaded by weeds, but such a stand can be obtained only on fertile land, and old paspalum country usually is not particularly fertile. The fact that the usefulness of Kikuyu grass in the coastal dairying districts is limited mainly by soil fertility should be borne in mind by all farmers proposing to plant this grass. Either the land must be fairly fertile at the time of planting or steps must be taken to ensure the building up of fertility by manuring or other means.

Kikuyu grass is planted extensively on the deep, loose scrub soils of elevated areas in the southern coastal districts, and in areas such as the Maleny Plateau, Beechmont, Springbrook and Tamborine Mountain is steadily replacing paspalum. It is apparent, however, that even in those districts in which Kikuyu grass produces satisfactorily when first planted deterioration may be expected to occur where proper methods of treatment and management are not adopted. Before additional plantings of Kikuyu grass are made on farms in these areas, therefore, the practicability of maintaining high productivity should be given careful consideration.

There are few other soil types in the coastal dairying districts which support vigorous stands of Kikuyu grass. Very little of the forest country on which carpet grass has invaded paspalum pastures is suitable

for Kikuyu grass without an appreciable improvement in soil fertility, and much of the hilly country carrying paspalum pastures which were established many years ago on scrub soils is also unsuitable for the grass. In such areas, if Kikuyu grass is planted it should be confined to cultivable land of fairly high fertility, or planted adjacent to yards and buildings from which washings and manure may be collected for distribution over the pasture. On rough country where bracken fern is prevalent, Kikuyu grass can be planted to encourage the stock to work amongst the fern, but unless the soil is of reasonably high fertility eventual transformation of the planted area into a high-producing pasture cannot be expected.

Plate 28.
KIKUYU GRASS AT MALENY, SHOWING RUNNERS.

One method of maintaining or building up soil fertility to the level required to sustain high production of Kikuyu grass is to plant the grass in small paddocks and to use these in turn for holding paddocks, so that a good deal of manure is dropped on the pastures. This, of course, is robbing the outside paddocks in order to support the selected Kikuyu grass pastures, but it may be advantageous in that much of the manure, which would under normal conditions be wasted in the larger paddocks for want of scattering by harrows, could be efficiently spread in the smaller paddocks.

Although Kikuyu grass sets seed in Queensland, none is collected for planting purposes, and propagation is by means of cuttings of rooted runners or erect stems. Each planting slip need not be more than a few inches in length, but it should have at least two joints. Sometimes the runners are raked up and put through a chaffcutter with a wide spacing. The best time to plant is during the early summer, though plantings may be carried out in the spring if the rainfall is satisfactory.

When the land can be cultivated, it should be ploughed and harrowed and the cuttings planted three feet apart in drills spaced from

two to three feet apart. Sometimes the land is put down to a summer-growing row crop, such as maize, and the cuttings planted in the inter-rows during late summer. The cuttings when planted in drills should be partly covered by hoeing earth on to them, and the soil should be firmed about each cutting by pressure with the foot. Occasionally, furrows are run across a grass paddock and Kikuyu grass cuttings planted in the furrows; this procedure does not give satisfactory results unless the land is of good quality, and even then it is preferable to plough before planting. When the grass is planted for special purposes on rough country, the most practicable method of planting is to mattock the cuttings in and tramp the soil firmly around them.

Kikuyu grass is a troublesome weed when it invades cultivation paddocks, plantations and orchards, and the grass should not be deliberately planted near such areas. It is advisable to eradicate any plants that may have become established close to cropped areas by means of seed or stem pieces carried on the feet of cattle.

Elephant Grass.

Elephant grass is not commonly found on dairy farms in Queensland mainly because of the shortage of planting material. In recent years the grass has shown itself to be a useful standby for feeding purposes in very dry times in which the main pastures are bare. Elephant grass produces a high tonnage of green stuff per acre and for this reason requires to be supplied with ample plant foods. On dairy farms these are best supplied in the form of animal manure. Elephant grass if not kept grazed down grows very stemmy and in this condition is of little value as a stock food. Because of the necessity for manuring and the need for carefully controlled grazing, elephant grass should be planted in small paddocks close to the cow yards. Given proper attention, this grass will provide very useful grazing, and it may also be cut and fed to stock as chaff.

Elephant grass is usually planted by means of stem cuttings, and these should be taken from hard stems about six months old. Each cutting should have four or five joints. The cuttings may be planted in shallow furrows and completely covered, or they may be dibbled in, with portion of their length protruding. Planting to provide a spacing of three feet each way is usual. After the grass is planted, the inter-rows should be cultivated until the grass is well established.

Para Grass. (Plate 29.)

In the southern coastal districts, Para grass, which is also commonly known as giant couch, is best suited to fairly low-lying country, though it may be used under ordinary paddock conditions when soil moisture is adequate. Unlike Kikuyu grass, Para grass is particularly susceptible to frost damage, but if it goes into the winter with a good top-growth there is little likelihood of the stand being destroyed.

A fairly large acreage of Para grass has been planted by seed in the northern districts, but seed is not now available commercially and all plantings, at least in southern Queensland, are by stem cuttings. These should have two or three joints and at least one joint should be buried in the soil at the time of planting. Rooting takes place at the buried joints and a good ground cover is usually obtained in a short time even if the cuttings are planted as far apart as six feet. Cultivable land should be ploughed before planting. When ample fresh stems are available, furrows may be run out three feet apart and mowings or chopped-up

Plate 29.
A PADDOCK OF PARA GRASS ON THE NORTH COAST.

pieces of the stems dropped in the furrows and covered by means of a plough. On areas carrying logs or stumps, or which are too wet or stony for ploughing, the grass must be mattocked in. The best time to plant is during the summer rainy period.

Para grass may become a pest in low-lying cultivation paddocks and so should be carefully watched to see that it does not encroach on such areas. It should not be planted near drains or irrigation channels, as it is likely to block them.

Guinea Grasses.

Several types of Guinea grass are grown in Queensland. These range from the slender, fine-stemmed Guinea grass (which is also known

Plate 30.
AN HAWAIIAN STRAIN OF GUINEA GRASS UNDER TEST IN QUEENSLAND.

as green panic) to very tall, coarse types (Plate 30). Some of the types are extremely useful pasture plants (Plate 31) and are quite suitable for use on coastal dairy farms. As the only propagating material available is that obtained by breaking up the crowns of the plants, it is unusual for a farmer to plant more than a small paddock of Guinea grass. In Queensland, the Guinea grasses are found wild on railway embankments and in waste places, but for pasture purposes they should be planted on fertile soils.

Plate 31.
A Guinea Grass Paddock.

The Guinea grasses set seed, but germination is usually very poor and little establishment from seed is effected. The rooted pieces of the crowns should be set out in furrows on cultivated land about two feet apart each way. It is generally found that the stand thickens up by self-seeding.

Plate 32.
A Year-old Stand of Molasses Grass on a Scrub "Burn."

Plate 33.

SHOWING ENTIRE DESTRUCTION BY FIRE OF PORTION OF THE MOLASSES GRASS STAND SHOWN IN PLATE 32.

Molasses Grass.

Molasses grass is frequently given consideration for planting purposes by southern dairy farmers, mainly because of its reputation as a weed-suppressing grass on northern scrub burns. Very little success has been achieved with this grass in the southern districts of the State and its planting cannot be confidently recommended. One of its greatest drawbacks in coastal districts is its susceptibility to destruction by fires. This is illustrated by Plates 32 and 33. If a fierce fire sweeps over a molasses grass pasture the plants are entirely destroyed. Molasses grass does not stand up to grazing as well as the grasses now in common use in the dairying districts.

Urochloa Grass.

Normally Urochloa grass behaves as an annual, coming up from seed in the spring months and dying right out in the autumn. Despite its annual habit, this grass is extremely useful for grazing purposes on parts of the Darling Downs. On the coast, however, perennial weeds would almost certainly come into any pasture paddocks left bare during the winter and early spring months; hence the usefulness of Urochloa grass under coastal conditions would be very restricted. As it cannot be relied upon to regenerate itself sufficiently to provide a useful pasture in the second and subsequent years after sowing, Urochloa grass can only be regarded on the coast as a summer-growing annual fodder plant. There are many more useful fodder plants available for the summer months.

African Star Grass.

Since it was introduced from Africa some years ago, African Star grass has become distributed throughout the dairying districts of the State and in some areas is regarded as a useful pasture. However, feeding tests have shown the grass to be poisonous to livestock at certain stages and for this reason its planting as an alternative to grasses known to be harmless cannot be recommended.

Production of Seed Wheat.

R. E. SOUTTER, Plant Breeder.

IN the main wheat-producing States of the Commonwealth, commercial production of pure seed of the wheat varieties in general cultivation is undertaken chiefly by growers, many of whom specialise in this important phase of the wheat industry. This position does not apply in Queensland, and the fact that local varieties have retained their identity to the extent which they have is due largely to the efforts of the State Wheat Board. As it is in the best interests of the industry that varietial purity is maintained, it is desirable that a greater number of growers should produce their own seed. The following suggestions are made for the guidance of growers contemplating the selection of seed from the crop paddocks or the sowing of special pure seed areas.

Selection from Main Crop.

To be suitable for seed selection purposes, a crop should be true to variety, free of plants—such as barley, wild oat, and other weeds—with seeds likely to contaminate the seed wheat, and show no signs of flag, ball, or loose smut.

If a careful inspection reveals that the crop will be suitable for seed after a little roguing—that is, the removal of undesirable plants such as strange wheats, barleys, oats, &c.—an area in the middle of the paddock sufficiently large to provide the quantity of seed required should be selected for the purpose. By choosing such a central position, both the first sown and the first harvested portions of the crop are eliminated, with the result that the seed obtained runs a very slight risk of contamination through the medium of the seed drill and the harvesting machinery.

Special Sowings for Seed.

Although seed selection from the main crop is worth while, more satisfactory results may be achieved by sowing an area especially for pure seed purposes. The grower should select from the variety he intends to propagate a bag or two of the best typical heads and sow the resulting grain in a nursery plot. This plot should be so situated that it may be kept under close observation and must, of course, be protected from stock. This plot must be harvested and threshed by hand, in order to avoid contamination. The seed so obtained should in the following season be sown last in a field of the same variety, and at harvest time care must be taken to ensure that the machine being used is thoroughly cleaned of grain before the area is harvested and that the bags containing the stud grain are clearly marked.

The risk of loss by fire can be reduced considerably by cutting for hay a swath, say half a chain wide, round each paddock, and then ploughing or undercutting the hayed area. Where the areas are large, they should be cut into sections of from 100 to 200 acres as a safeguard against fire. This division also facilitates harvesting and provides a valuable reserve of wheaten hay.

All seed should be graded before sowing: this process not only removes all impurities, but also tends to promote a more even sowing and to the production of stronger and more prolific plants. Seed treatment for the control of smuts should be practised.

Advice on Seed Crops.

Should a number of growers in a locality desire to obtain advice as to the suitability or otherwise of portion of their crops for seed purposes, application should be made to the Department of Agriculture and Stock, when the services of a wheat specialist will be made available.

Vegetable Production

Fertilizing Tomatoes.

L. G. VALLANCE, M.Sc. Chemist.

HIGH production of good quality tomatoes is closely linked with the use of correct fertilizing methods. As is the case in many other crops, quantity and quality go hand in hand. Vigorous healthy bushes tend to produce good yields of first-class tomatoes, while poor yields and inferior fruit are associated with unthrifty plants. Although the health and the vigour of a tomato plant depend upon many factors, the adequacy of the supply of various plant foods is of primary importance. Since the necessary plant foods can be largely provided by proper methods of fertilizing, the grower is able to exercise a considerable measure of control over yield and quality.

There are very few soils in Queensland which will grow tomatoes efficiently without fertilizer. Some virgin scrub soils of high natural fertility may produce well grown plants giving reasonable yields without fertilizer, but even in such cases the addition of fertilizers containing phosphoric acid and potash will usually result in an improvement in production.

Most fertilizer mixtures contain three major plant foods, namely, nitrogen, phosphoric acid, and potash. If the tomato plant is unable to obtain a sufficient amount of any one of these a depression of growth results. When suffering severely from a lack of either nitrogen, phosphoric acid or potash the plant usually exhibits definite characteristic symptoms. These symptoms may be fairly readily recognised when the deficiency is confined to a single element. For instance, if a tomato plant cannot obtain sufficient phosphoric acid it has a characteristic bluish appearance. However, it frequently happens that two or more plant foods are deficient at the same time, in which case the symptoms associated with each deficiency are masked and the plant shows simply poor general health.

It is therefore important to use a fertilizer which will supply all three of the major plant foods in the early stages of the growth of the plant. Such a fertilizer is known as a complete mixture. In applying fertilizer to tomatoes it is not sufficient merely to ensure that the plant will not suffer from the lack of any of these plant foods; it is also necessary to make certain that the three are provided in balanced proportions. This may be readily understood if it is realised that, when an excessive amount of a concentrated source of any one plant food is made available, it creates an abnormal environment for the plant. Under these circumstances the plant may take up more than it requires of a particular element, and its growth, and particularly its yield, may be consequently adversely affected.

A discussion of the effects of these plant foods in the various forms in which they can be purchased may help in the understanding of the part they play in the nutrition of the tomato plant.

NITROGEN.

The tomato plant is very sensitive in its reaction to the presence of nitrogen. This element is essential for the maintenance of vigorous and healthy growth. If incorrectly applied, however, it may promote growth at the expense of fruit setting, and have a particularly adverse effect on earliness. The provision of large amounts of nitrogen is undesirable before the first fruit cluster has set. After this, the plant must have access to ample available nitrogen in order to make a large, well-formed bush, capable of carrying the maximum number of fruit clusters. Growers with irrigation facilities can use nitrogenous fertilizers very effectively for stimulating vegetable growth.

Nitrogen should be present in the pre-planting mixture—that is, the fertilizer mixture which is applied to the soil before the plants are set out in the field. This is necessary because most Queensland soils in areas suitable for tomato growing contain very little nitrogen which is readily available to the plant. However, only moderate amounts should be applied. If the young plant has access to too much nitrogen in relation to the amount of phosphoric acid available, the growth and yield will be decidedly unsatisfactory. This fact is borne out by much practical experience and also by the results of experimental work. In three trials, given below, which formed part of a series of fertilizer studies, the inclusion of a phosphoric acid carrier in the pre-planting fertilizer, produced an outstanding increase in yield over that obtained from the plants which were grown on a purely nitrogenous fertilizer.

TOMATO YIELDS IN POUNDS PER PLOT.

Fertilizer.	Farm No. 1.	Farm No. 2.	Farm No. 3.
Nitrogen and Phosphoric Acid	181	125	126
Nitrogen	150	115	54

The smaller differences which were obtained on Farm No. 2 are due to the fact that this area had been previously fertilized heavily with a phosphatic fertilizer; an analysis of the soil showed that it contained a considerable amount of readily available phosphoric acid. Obviously then, a fertilizer containing nitrogen alone should not be used before planting unless it is balanced with one containing a suitable amount of phosphoric acid.

Another objection to setting out the young plant in a soil in which there is a high concentration of nitrogenous fertilizer is the risk of severe root injury. This frequently occurs: the effect is shown in Plate 34. The tomato plants in the right foreground received excessive amounts of nitrogen. These plants were taken from the same seed-bed and were transplanted at the same time as those in the background. The latter, which are growing under conditions of adequate but not excessive nitrogen, show much superior growth and this was maintained throughout the season.

Plate 34.

The Inferior Growth of the Tomato Plants in the Foreground Shows the Effect of Excessive Nitrogen Application in the Pre-planting Mixture.

Many experienced growers are aware of the symptoms shown by a tomato plant when its roots are injured by fertilizers. The condition is usually referred to as fertilizer "burn." The term "burn" is rather a misnomer, and the condition would be better described as fertilizer injury. In the more pronounced cases, the plant is stunted and yellowish in colour. The leaves have a stiff appearance and the leaflets are small and are often folded upwards. In severe cases the plant makes little or no growth throughout the season. Sometimes a lateral shoot may develop and grow normally while the remainder of the plant retains the original symptoms. These extreme cases are fairly readily recognised, but, quite frequently, when the plant is less severely affected, the only visible symptoms are a somewhat cramped appearance of the early leaves and the absence of vigorous lateral growth. If the weather conditions are satisfactory, the plant apparently recovers; nevertheless, fruiting is adversely affected in regard to both earliness and yield.

Therefore, it is desirable to divide the fertilizing programme, particularly as regards nitrogen, into two sections, namely, (1) a pre-planting application, and (2) one or more applications as side dressings. In the pre-planting application, the amount of nitrogen is kept within the limits necessary to satisfy the requirement of the young plant. The nitrogen needed for the subsequent growth and maintenance of a large, vigorous bush should be applied as side-dressings.

The two main sources of supply of nitrogen in commercial mixtures in use in Queensland are ammonium sulphate and blood. Both of these may be satisfactorily used to provide the tomato plant with its requirement of nitrogen. However, because of their different chemical constitutions, the method of handling is not the same in both cases.

Ammonium Sulphate.

This nitrogen carrier is water-soluble and can be used in both the pre-planting mixture and the side-dressing. It should not be used alone as a pre-planting fertilizer but should always be mixed with a phosphoric acid carrier, such as superphosphate or bonedust. Because it is readily soluble in water ammonium sulphate is a very satisfactory medium for supplying nitrogen as a side-dressing. Rain or irrigation water will quickly carry it down to the root zone, thus obviating the necessity for deep placement, with the consequent breaking and tearing of roots by the cultivating implement.

Blood.

This material contains a considerable amount of nitrogen, which is present in a form suitable for use as a fertilizer for tomatoes. Blood may be purchased as either dried blood or meatworks fertilizer. Since dried blood contains no major fertilizing constituent other than nitrogen it should not be used alone as a pre-planting application but it may be satisfactorily used alone as a side-dressing. When used for the latter purpose it must be thoroughly mixed with the soil, because until it has been acted upon by soil bacteria its nitrogen is not readily available to the plant. Meatworks fertilizer, or, as it is commonly known, blood and bone, may be used in the pre-planting application, because, in addition to the nitrogen of the blood, there is present a considerable amount of phosphoric acid. The ratio of nitrogen to phosphoric acid in blood and bone varies somewhat, but the proportion is usually in the vicinity of 1 : 3 or 1 : 4, which is eminently suitable for use in the pre-planting application. When tomatoes are to be grown in soils which contain high amounts of potash due to natural causes or to the previous fertilizing history, meatworks fertilizer forms an excellent pre-planting mixture. Generally, however, it is advisable to plant tomatoes on a complete mixture—that is, one containing potash as well as nitrogen and phosphoric acid. This aspect is further discussed under the heading—Meatworks fertilizer (page 81).

Nitrate of Soda.

Nitrate of soda is a water-soluble chemical fertilizer, capable of supplying nitrogen in a very quickly available form. Because it contains no phosphoric acid it should not be used alone as a pre-planting fertilizer. Moreover, since it has a high capacity for taking up moisture, thus leading to caking, nitrate of soda is not used as the nitrogen carrier in complete fertilizer mixtures prepared for use under Queensland climatic conditions. Under these circumstances the use of sodium nitrate in tomato production is limited to side-dressings.

PHOSPHORIC ACID.

In Queensland, soils which are suitable for tomato production seldom contain sufficient phosphoric acid under natural conditions to produce maximum yields. Tomato plants growing in a phosphate-deficient soil show very noticable symptoms, the most characteristic of which is a bluish colouration of the leaves. The veins on the under-side of the leaves exhibit a reddish-purple colour. These symptoms occur quite early in the life of the plants. In the seed-bed, phosphoric acid deficiency is indicated by the general bluish tinge of the leaves and by the very slow growth of the seedlings. Plants which have been grown in a seed-bed with ample supplies of phosphoric acid will, if planted out in a soil deficient in phosphate, within 10 to 14 days show evidence of lack of this element. Here again a bluish colour develops and the plants make very tardy growth. The stems are thin and fruiting is considerably delayed. If growing conditions as regards temperature and moisture are good, the plants will respond to an application of a readily available phosphatic fertilizer such as superphosphate. Plants which are slow in starting growth owing to bad weather conditions at transplanting very often show this bluish colouration even though ample quantities of phosphatic fertilizer have been applied to the soil. This is particularly noticeable in winter plantings and is due to a temporary slowing-up in the uptake of phosphoric acid. Under these circumstances the application of more fertilizer will not correct the condition. However, as growing conditions improve, the plant is able to take up its requirement of phosphoric acid and the normal healthy green colour returns.

For maximum growth and yield the plant requires access to ample quantities of readily available phosphoric acid. Experimental work and practical experience have demonstrated that a reduction in yield is more often due to a deficiency of this food material than to a lack of either nitrogen or potash. Many Queensland soils possess the ability to "fix," and so render unavailable to the plant, a certain proportion of the phosphoric acid applied as fertilizer. Because of this fact, and also because the young plant must be supplied in its early stages, a liberal dressing of phosphoric acid is advisable in the pre-planting application. When this has been given, small amounts only are necessary as side-dressings. It should be noticed that this procedure is fundamentally different from the application of nitrogen, which is not fixed by the soil and is not required in large amounts in the pre-planting application.

In Queensland, phosphoric acid is available commercially as (*a*) superphosphate, (*b*) bone dust, and (*c*) meatworks fertilizer. These may be purchased singly or mixed in varying proportions in a complete fertilizer. Although all these fertilizers are excellent carriers of phosphoric acid, for tomato culture their different chemical characteristics require that they should be applied somewhat differently.

Superphosphate.

The greater portion of the phosphoric acid in superphosphate is present in a form which is soluble in water and consequently in moist soils it becomes quickly available for plant growth. It may be used both in the pre-planting application and also in the side-dressing. Unlike nitrogenous materials, superphosphate does not cause any appreciable injury when it comes into contact with the roots. Therefore it is eminently suitable for supplying the liberal amounts of phosphoric acid which are necessary in the pre-planting mixture to

overcome the effect of soil fixation and provide a readily available supply for the young plant. In soils which contain reasonable quantities of nitrogen and potash under natural conditions, superphosphate may be used alone as a pre-planting fertilizer. This, however, is not generally recommended and superphosphate is most efficiently used in combination with nitrogen and potash to form a complete fertilizer.

Bonedust.

Unlike that of superphosphate, the phosphoric acid content of bonedust is not soluble in water. It becomes available only after it has been acted upon by the minute organisms which live in the soil and cause decomposition to take place. This action takes time, the length of which depends upon the temperature and moisture content of the soil. In southern Queensland during the late summer and early autumn it would appear that a considerable amount of phosphoric acid becomes available two or three weeks after the bonedust has been applied. For this to occur, however, it is essential that bonedust be intimately mixed with the soil. Decomposition is much slower when the soil is dry and for this reason bonedust is more suited for use in irrigated areas where some measure of control over moisture may be exercised. When used on non-irrigated land enough moisture must be present in the soil to ensure that, at the time of transplanting, the bonedust will have undergone sufficient decomposition to supply the young plants with phosphoric acid. As the time taken to do this is from two to three weeks under conditions of ample soil moisture there is a distinct element of risk when using bonedust under dry conditions. If the weather is such that the soil is dry and the grower is waiting for rain to transplant, then it is better to use superphosphate as the phosphoric acid carrier in the pre-planting mixture or, alternatively, a fertilizer mixture in which the phosphoric acid is present partly as superphosphate and partly as bonedust.

Because of its slow rate of availability and the necessity for very thorough mixing with the soil, bonedust is most efficiently applied before planting. It is preferable that any phosphoric acid to be applied as a side-dressing should be applied in the form of the water-soluble superphosphate.

Meatworks Fertilizer.

The main fertilizing constituents of meatworks fertilizer are blood, which supplies nitrogen, and some form of bone, which supplies phosphoric acid. The salient points of these two substances have already been discussed separately. Because meatworks fertilizer contains nitrogen and phosphoric acid in the ratio of one part of nitrogen to three or four parts of phosphoric acid it constitutes an excellent fertilizer for use prior to planting out under certain conditions. The first of these is that the potash content of the soil is available quickly enough to ensure that the growth of the young plant is not affected by lack of potash prior to its receiving this element as a side-dressing. The second is that seasonal conditions are such that the plant foods in the fertilizer are made available to the plants. The rate of decomposition of the blood and bone is dependent largely upon soil moisture and temperature. Summer and early autumn applications decompose readily, and experimental work indicates that at this period meatworks fertilizer may be used satisfactorily, provided of course that the potash requirement is also satisfied.

When the abovementioned conditions have been observed growers using meatworks fertilizer alone for pre-planting, and side-dressing with a mixture containing six per cent. potash, have grown excellent crops of tomatoes. A satisfactory rate of application is about 8 lb. per chain with similar amounts of a 5-13-5-6 water-soluble mixture as a side-dressing. The blood and bone should be applied in the drill at least three weeks before planting and well mixed with the soil by scuffling. It is also advisable to make frequent inspections to ascertain whether any lumps of rotting fertilizer are still present towards the bottom of the drill. Should any such be found, the field is not yet ready for planting. If the above-mentioned precautions are observed meatworks fertilizer may be used for the pre-planting application. However, the alternative method in which blood and bone is employed in a mixture with some water-soluble ammonium sulphate, superphosphate and potash, is more generally recommended.

POTASH.

The part played by potash in the nutrition of the tomato is particularly important. With the exception of the very sandy types, Queensland soils in vegetable growing areas are, in general, fairly well supplied with this essential plant food. This fact has been revealed by a large number of soil analyses. However, in many instances this soil potash is not made available quickly enough to maintain the rapid growth and heavy fruit-setting which is characteristic of the tomato plant under optimum conditions. An analysis of the fruit itself indicates that under normal conditions it contains approximately 0·3 per cent. potash. From this it may be calculated that 80 cases of tomatoes each containing 28 lb. of fruit will remove from the soil an amount of potash equivalent to that contained in 1 cwt. of a mixture containing 6 per cent. potash. It is, therefore, evident that intensive cultivation to tomatoes constitutes a considerable drain on the potash reserves of the soil and the necessity of maintaining the level of this important plant food requires the application of potassic fertilizers. Furthermore, investigational work has shown that there is a close connection between fruit quality and potash, the production of first quality fruit of satisfactory "bloom" and firmness depending upon the plant receiving adequate amounts of readily available potash.

The most commonly used potassium salts which may be conveniently applied to the soil are sulphate of potash and potassium chloride, or, as it is more familiarly known, muriate of potash. Either of these two substances is very well suited for use in tomato production and the results of experimental work indicate that they are apparently equally satisfactory. Because of the difficulty of obtaining supplies of sulphate of potash under war time conditions, tomato crops in Queensland have been grown during the war years using the muriate as the sole source of potash.

It should be borne in mind that any potassium salt is a highly reactive substance and therefore the roots of the young plant will suffer injury if set out in a soil containing an excessive concentration. Because of this, only a portion of the amount required to carry the crop to completion should be supplied in the pre-planting application, the remainder being applied as a side-dressing. Potash is most conveniently applied as a constituent of a complete fertilizer mixture.

RECOMMENDATIONS.

In deciding upon a satisfactory fertilizing programme for the production of tomatoes the grower is faced with three important considerations. These are (*a*) type of fertilizer to be used; (*b*) amounts required; and (*c*) placement and time of application.

Type of Fertilizer.

At present it is considered that the most satisfactory method is to use a complete mixture—that is, one which contains nitrogen, phosphoric acid and potash—for both the pre-planting and early side-dressing applications. A very satisfactory formula for the pre-planting mixture is one which contains approximately 4·5 per cent. nitrogen, 13·5 phosphoric acid, and 6 per cent. potash. It may be noted that the ratio of nitrogen to phosphoric acid is one to three and this ratio together with the amount of potash indicated by the formula gives excellent results. This mixture also gives satisfactory results when applied as a side-dressing.

Since the constituents of which such a mixture may be composed have already been discussed, the material make-up of the various mixtures may be summarised as follows:—

Nitrogen carriers	(*a*) ammonium sulphate (chemical). (*b*) blood (organic).
Phosphoric acid carriers	(*a*) superphosphate (chemical). (*b*) bone (organic).
Potash carriers	(*a*) sulphate of potash (chemical). (*b*) muriate of potash (chemical).

A considerable amount of experimental evidence and practical experience is available to indicate that it is not essential to have any particular source of either nitrogen, phosphoric acid, or potash. Therefore a suitable fertilizer mixture may be composed solely of the chemical fertilizer carriers or it may consist of a mixture of chemical and organic materials. No matter what is used, if sufficient soil moisture is present and the material is applied at the correct time, there will be no significant difference in either growth or the yield of the tomato plants. This is well illustrated by the results of an experiment in which two mixtures were used before planting. Mixture A contained: nitrogen, 5 per cent. as ammonium sulphate; phosphoric acid, 12·5 per cent. as superphosphate; and potash, 4 per cent. as muriate. Mixture B contained: nitrogen, 3 per cent. as blood plus 2 per cent. as ammonium sulphate; phosphoric acid, 7.5 per cent. as bone plus 5 per cent. as superphosphate; potash, 4 per cent. as muriate. It will be noted that mixture A is completely chemical, whilst mixture B is partly organic and partly chemical. The average yield of the plots receiving mixture A was 192 lb. of tomatoes as compared with 201 lb. from those fertilized with mixture B. The small difference is not significant, being due to factors other than fertilizer treatment. It should be pointed out that this experiment was carried out under irrigation, on a fairly heavy-textured, red loam soil. Under these circumstances, while ample soil moisture was present to ensure decomposition of the organic materials, there was no loss of fertilizer from the chemical mixture by leaching, such as occurs under conditions of excessively free drainage.

Therefore, since the chemical and organic ingredients which make up a fertilizer mixture are equally suitable for providing the tomato with the required plant foods, the grower in his selection of a mixture is concerned almost wholly with the conditions under which it is to be used. For the pre-planting application, a mixture which is partly organic and partly chemical is to be preferred, simply because there is less likelihood of loss by the leaching effect of rain or irrigation water before it is taken up by the plant. In contrast to this, the mixture preferred for side-dressing is one in which the ingredients are wholly water-soluble—that is, it is composed of ammonium sulphate, superphosphate and potash. When such a mixture is used it is possible for the plant foods to be carried down to the root zone by descending water without the necessity for deep placement and the consequent tearing and disturbing of the roots.

Amounts Required.

The content of available plant food varies greatly in the different soil types. This may be due either to past fertilizing practices or to differences in the natural fertility. Therefore, just as it is not possible to be dogmatic within very fine limits as to the most effective formula for a tomato fertilizer, neither is it possible to specify closely the amounts required. Fortunately, however, the economics of tomato production do not render this necessary. It is better to use a surplus of fertilizer than to risk using too little; provided, of course, that the amounts are not so excessive as to cause plant injury. The amounts stated below, if properly applied, will not cause any depression in growth due to any undesirable concentration of fertilizer about the roots of the plant.

Since the tomato crop is planted in rows and the fertilizer is most efficiently placed along the drill it is more useful to state the fertilizer requirements in pounds per chain than in hundredweights per acre. When using a mixture of the approximate formula, 4·5-13·5-6, a satisfactory rate for the pre-planting application is about 7 lb. per chain for the heavier classes of soil, such as loams and clay loams. On the lighter types—that is, sands and sandy loams—this amount should be reduced to 5 lb. per chain, with a corresponding increase in the amount applied as side-dressing. This is desirable in order to avoid loss of appreciable amounts of the water-soluble portion of the mixture under the conditions of very free drainage which exist in these soils.

In general, only one side-dressing is necessary on the heavier soils when the initial dressing is applied at the rate of 7 lb. per chain. This should be applied at the rate of approximately 4 lb. of the water-soluble mixture per chain. Side-dressing on the lighter soil types is best accomplished by an application of a similar mixture at the rate of 6 lb. per chain. In the case of trellised or staked crops, on these soils this side-dressing could, with advantage, be divided into two applications, with an interval of about three weeks between them. This will minimise the possibility of fertilizer loss by the leaching effect of rain or irrigation water. Since ground crops usually produce an extensive lateral spread over the surface of the soil it is difficult to apply a late side-dressing effectively. However, if the variety is one in which the bush is of a compact and erect habit, the method recommended for trellised or staked crops is advisable.

Water-soluble fertilizers which contain nitrogen only, such as ammonium sulphate and nitrate of soda, have their place in the side-dressing programme. They may be used as a late side-dressing for trellised or staked crops and are applied at the beginning of the harvesting of the lower hands. The application of nitrogen at this period very often stimulates the growth of the plant and assists it to produce fruit of a marketable size and quality from the uppermost fruit clusters. However, the application of nitrogen at this stage must be left to the discretion of the grower as so much depends upon the incidence of disease, weather conditions, and the state of the market. As would be expected, the value of this late side-dressing is difficult to assess experimentally, but a considerable amount of practical experience indicates that when any of the above nitrogen carriers are used in this way the results are often well worth while. A suggested rate is 2 lb. per chain in the case of ammonium sulphate and 3 lb. per chain for sodium nitrate.

Placement and Time of Application.

One of the most important aspects of tomato fertilizing is the question of the correct method of application. It is necessary that the recommended mixtures should be applied at the right time and in the right place. Since there are certain fundamental differences in the handling of the pre-planting and side-dressing applications they will be discussed separately.

The pre-planting fertilizer should be placed in a band along the length of the row rather than broadcast over the whole surface. The most efficient method of doing so is to open up a drill about 8 to 9 inches deep, throw the fertilizer as evenly as possible along the bottom and lower portion of the sides, and scuffle in almost immediately. Most of the fertilizer will then be directly below the plant but will be sufficiently deep to ensure that the young plant is not placed directly into soil containing high concentrations of fertilizer.

When a pre-planting mixture which contains part of its nitrogen and phosphoric acid as blood and bone is used, it should be applied in the drill about three weeks before planting, in order to lessen the risk of fertilizer injury which is likely to occur should the roots of the young plant make contact with the blood and bone in process of decomposition. The decomposition of this material is accelerated by stirring the soil; therefore, it is a wise plan to scuffle the soil in the drill at least twice during the period between the application of fertilizer and transplanting. Just before planting it is usually necessary to re-plough the drill and scuffle again. Furthermore, since the presence of adequate soil moisture tends to hasten the decomposition of blood and bone, it is advisable to give the land a watering, wherever irrigation is available, particularly if the soil is somewhat dry at the time of fertilizing. There are times, however, when, because of weather conditions interfering with the preparation of the land, it may not be possible to allow the requisite period to elapse between the application of fertilizer and planting. It is then preferable to use a mixture in which blood and bone is not present—that is, one which contains only ammonium sulphate, superphosphate, and bonedust. This may be applied to the soil within a day or so prior to setting out the plants without the risk of serious injury, provided it is well mixed with the

soil and not more than about 5 lb. per chain is applied. However, when such a procedure is followed delay in the formation and maturing of the early hands often ensues. This is probably due to the presence of a considerable amount of readily available nitrogen provided by the ammonium sulphate. It is desirable to avoid this, and therefore the grower should aim at getting the fertilizer in the drill approximately three weeks before planting. By using a fertilizer composed partly of organic and partly of chemical ingredients there is little risk of loss of plant foods under reasonably satisfactory weather conditions.

The water-soluble mixture recommended for the side-dressing should be applied along both sides of the row in a band 3 to 4 inches from the base of the plant and 15 to 18 inches in width. It is not applied until the first fruit cluster is set; this is usually 3-5 weeks after transplanting. Because it is water-soluble, only a very light cultivation with the scuffler is necessary to work the fertilizer into the soil. Whenever a side-dressing is given, every care should be taken to avoid breaking the roots in the subsequent scuffling. This advice is particularly applicable in the case of sandy and sandy loam soils, where a second side-dressing about three weeks after the first is recommended. As previously suggested, for staked or trellised crops a nitrogenous fertilizer may be used as a late side-dressing, and applied 10 to 12 weeks after planting. Only the water-soluble nitrogen carriers—ammonium sulphate or nitrate of soda—should be used, and they should be applied in the same manner as the mixture but not scuffled in as the plant will suffer a serious check if its roots are damaged whilst it is supporting a crop of fruit. Moreover, deep placement is not necessary since, because of their high degree of solubility, either of these fertilizers will be carried down into the root zone by rain or irrigation water.

CHANGE OF ADDRESS.

Changes of address should be notified at least fourteen days before the date of issue with which the change is to take effect. The former address should be given as well as the full Christian names and surname of the subscriber.

Address all communications to the Under Secretary, Department of Agriculture and Stock, Brisbane.

PLANT PROTECTION

Principles of Biological Control.

J. HAROLD SMITH, Officer in Charge, Science Branch.

THE balance between insect pests and their natural enemies is rather precarious and can easily be disturbed by climatic conditions in an area, cultural practices in a crop, and other factors which affect the two sets of insects in different ways. Few parasites and predators keep a host insect under permanent control, and as a consequence, pest outbreaks which cause a great deal of damage to farmers' crops are a commonplace. If the natural enemies are ineffective, the outbreak may last for a long time, though its intensity will vary with the suitability of climatic and other conditions for the host insect. The precise behaviour of both the pest and its enemies can seldom be forecast accurately even when their habits are well known. The history of biological control, i.e., the use of parasites and predators to control pests, is therefore a record of some spectacular successes and numerous failures. These failures are an indication of the difficulties encountered in work of this kind and the need for further information on the relationships of the more important pests to their parasites and predators.

Working Principles.

The working principles involved in the application of biological control methods are subject to modification as research and experience supply new data. A brief review of some of them will perhaps indicate the difficulties encountered in work of this kind.

(*a*) Native insects usually have many natural enemies and, when they become pests, it may be assumed that clearing, cropping, and other agricultural practices have disturbed the natural balance between them. The changes brought about in these ways are presumably favourable to the pests and unfavourable, or less favourable, to their natural enemies. Parasites and predators of related pests in other countries prove less efficient, when introduced, than the local species unless they can attack several hosts, are more tolerant of field or orchard conditions than those already present, and destroy the host insects in a developmental stage—egg, larva, or pupa—which escapes the attention of native enemies. These conditions are very exacting and, generally, it may be assumed that native pests cannot be controlled by insect parasites or predators introduced from another country.

(*b*) Introduced pests have either eluded quarantine barriers or were already present before efficient quarantine inspection services were established. If these insects were unaccompanied by the parasites and predators which assist in controlling them in their own country, they may increase rapidly and cause a great deal of crop wastage in their new home. When the natural enemies are introduced, they may attack the pest in its new environment and bring it under control. Most of the classic example of biological control are of this kind. They entailed a diligent search for the natural enemies of a pest in its country of origin, an estimate of their respective merits as possible introductions, the

transfer of the selected species to the country where the pest had gained a foothold, and finally its establishment there.

(*c*) Parasites and predators, like their hosts, are often attacked by other insects. These are usually hyperparasites in the case of parasites, and parasites in the case of predators. If they are introduced along with an insect which attacks the pest to be controlled, they considerably limit its value. The precautions normally taken in biological control practice to exclude the unwanted insects may, in part, explain the phenomenon that a parasite or predator is sometimes more effective in controlling its host insect in the country to which it is introduced than in the country from which it comes.

(*d*) It is sometimes difficult to decide which of the several parasites or predators of an insect should be selected for introduction; species of apparently quite minor importance may, in the new environment, prove more efficient than those which are more common. As a general rule, however, the parasite or predator selected for introduction should either control the pest in its native country, or else appear capable of doing so if it were not hampered by the activities of secondary parasites or other natural enemies.

(*e*) A single parasitic species may not give adequate control of a pest, but two or more such insects attacking successive stages in its development may do so. If at all possible, more than one parasite should be established for the control of an introduced pest, and these should each attack a different stage of the host insect—egg, larva, pupa, or adult.

(*f*) Parasites should be drawn from widely separated areas in the country of origin. In the more specialised groups of parasitic insects, there are indications that local strains of a parasite may be adapted to particular districts and differ somewhat in their habits and a great deal in their efficiency. Consequently, parasites collected in one district may not include some local strains which might be efficient when transferred to another country. Parasites, therefore, should be collected in widely separated areas for shipment.

Procedure Involved in Insect Introductions.

From the above generalisations, it will be obvious that an entomologist must ask himself many questions when biological control is suggested as a means of curbing the activities of a troublesome pest. He requires to know the importance of the pest, the likelihood of attacks occurring each year, and whether or no the insect is native to the country. Assuming the insect has been introduced, he has to find out the part that parasites and predators play in keeping it in check in its native home. Then follow queries as to the efficiency of each natural enemy, the feasibility of collecting colonies of the best of these insects for shipment, and the possibility of breeding it in the insectary for later large-scale distribution in the field.

Precise answers can seldom be given to some of the more important of these questions from the available information on the insects concerned. It is not surprising, therefore, that a considerable measure of chance is associated with even the most carefully considered biological control project. In actual practice, hopes frequently remain unfulfilled, though sometimes success or partial success is achieved with a parasite or predator which is superficially quite unpromising. The speculative element in all biological control work is obviously high and can only be reduced by the accumulation of sufficient information on both the pest and its parasites and predators to permit a reasonably accurate forecast of what is likely to happen when the natural enemies are introduced.

Organising for the Mules Operation.

G. R. MOULE, Veterinary Officer, Sheep and Wool Branch.

THE Mules operation has given excellent results under field conditions in Queensland, where there are now over one million treated sheep.

As some graziers are reluctant to undertake the task of treating their flocks on account of labour shortages, the following article has been written describing the way the work may be organised. Incidentally, the manpower shortage is one of the strongest arguments in favour of the Mules operation. The work can be carried out expeditiously and easily and when once treated the sheep remain practically free from crutch strike for the rest of their lives.

When to treat the Sheep.

The operation is most easily performed when the sheep are within four weeks off shears, though it can also be done after crutching. The sooner after shearing or crutching the "Mulesing" is carried out, the easier.

Plate 35.

PERFORMING THE MULES OPERATION USING A CRADLE MOUNTED ON A RAISED SHEARING SHED FLOOR.

The ideal age for the treatment of sheep is between 5 and 10 months. The sheep are lighter to lift and handle the younger they are, and the earlier they are treated the sooner they are protected against crutch strike.

Under no circumstances should the Mules operation be carried out when the small black bush flies are plentiful, and it is preferable to undertake the work when the blowfly is not active. This means that the most suitable time to carry out the work is after the first frosts or in the middle of summer, provided the bush flies are not numerous.

Plate 36.
TIPPING THE CRADLE TO RELEASE THE SHEEP.

Sheep older than weaners may be treated, but after they pass the hogget stage the work of lifting and handling the animals increases. On many properties the weaners and "two tooths" have been treated in the first year the operation is performed and the weaners each year thereafter. This means that the flock is completely "mulesed" within about four or five years. In this way the Mules operation can be fitted into the normal station routine by keeping the young sheep handy after shearing or crutching and allowing a few days each year for the work. All ewes should be treated and the wethers can be done if very much trouble from crutch strike is occurring.

Using Cradles.

The Mules operation is performed most easily in the "Noondoo" type of cradle, specially designed for the work. These cradles can be mounted singly or in pairs, and one operator can work two cradles quite easily.

The Shannon lamb-marking cradles can be used to hold weaners for the operation, but they should be "set up" at an angle of about 15 degrees. However, they are not the ideal means of restraint.

Mounting the Cradles.

If "Noondoo" type cradles are used, they can be mounted on a shearing shed floor as shown in Plate 35. The floor of this shed is raised about 21 inches and the operator is standing in a hole which has been dug deep enough to give the optimum height for operating. The cradles move backwards and forwards along 2-inch pipes and they rotate through 90 degrees to release the treated sheep on its feet. (See Plate 36.)

Plate 37.

CRADLE MOUNTED ON A RAISED PLATFORM EXTENDING FROM A RAISED CLASSING RACE. THE CRADLE IS BEING FILLED.

Some properties arrange an extension of the raised platform of the classing race for the mounting of the Mules operation cradles, as shown in Plate 37.

With two cradles and one man catching and filling them an experienced operator can treat from 900 to 1,000 sheep per day. If only one cradle is used, from 450 to 500 sheep can be treated per day.

Holding the Sheep on a Rail.

The operation can be performed when the sheep are held on a rail set at comfortable height. The animals are held much the same as for lamb-marking, except that care must be taken to *keep the hocks together*. After the operation has been performed the treated sheep are released on their feet.

After-care of Treated Sheep.

There is no need to apply any dressing after the Mules operation has been performed, and it is preferable to allow the treated sheep to walk straight out of the yards into the paddock where they are to run. It will be found that the cuts will be almost completely healed within 10 to 14 days, and it is as well to leave the sheep alone for that period. Mustering or yarding after that time will not impede healing.

Have Your Shears in Good Order.

It greatly facilitates "Mulesing" if the shears are in good order. Five-inch dagging shears are used, and these should be ground down to a fine edge. The points of the shears should be ground off and the blades should ride evenly along their whole length. It is preferable to keep two pairs of shears to be used for Mules operation work only. While one pair is in use the spare pair can be kept in a disinfectant fluid until required.

Points in Sheep Husbandry.

J. L. HODGE, Senior Adviser, Sheep and Wool.

The Merino Ram.

PERHAPS the greatest single characteristic to look for in a Merino ram is prepotency, or, in other words, the capacity to stamp his progeny with his best characteristics of conformation and impart his wool type with some degree of certainty. In choosing a stud ram, apart altogether from his wool qualities, this prepotency is best indicated in the head of the animal. This should be definitely masculine with bold widely-spaced eyes and well-sprung horns without any tendency whatever to lie in to the side of the head. The neck should be strong and massive and well set in.

Generally, the longer and better the pedigree the greater the likelihood of the ram possessing this necessary and desirable quality of getting stock like himself. He must, of course, be given every chance in the selection of the ewes to be mated with him. Too strong a contrast in the mating of the sexes is not recommended. For instance, a strong-woolled ram on a very fine ewe does not necessarily give the "medium" progeny as many people think. There is a strong tendency to throw either very fine or very strong stock. Type to type is the safest mating. If a change in type is desired, the medium sheep comes into the picture as a "corrector." With a strictly medium sheep of proved pedigree there is a far better chance of getting the desired progeny from either the fine or the strong-woolled ewe.

Violent contrasts in type when mating should be avoided, and no attempt should be made to do in one year what should really require four or five years of careful breeding in the matter of selection.

Lamb Marking.

Lamb marking is an annual operation on all sheep-breeding properties. The operation consists of the placing of the registered ear-mark in the near ear of all female lambs, and in the off ear of all male lambs. In addition, the age mark (if such is used) is placed in the ear other than that carrying the registered mark. The tail is removed from all lambs. The length of tail is important, as there is abundant proof that with ewe lambs a tail left long enough to just cover the point of the vulva is a deterrent to blowfly strike as the ewe comes to maturity.

The testicles of all ram lambs are removed. There are two recognised methods of performing this operation. Slitting consists of a knife cut in the bottom of the purse. Tipping means the removal of the bottom of the purse. In both cases the testicles are withdrawn. Of the two methods, tipping is considered to be the more satisfactory. It is thought that the wound drains better and that, in the case of blowfly attack, the incision is more easily treated. It is admitted that slitting leaves a wether with a much more attractive cod, but when all things are considered, and especially the time element, as tipping is much faster, it is accordingly recommended. Lamb marking should be done preferably in temporary yards in the paddock in which the ewes and lambs are running. This not only saves driving ewes and young lambs distances too far for them, but greatly assists in the "mothering" after the business is all over. Old yards should not be used if there is any suspicion of infection in them.

The most satisfactory age at which to mark lambs is from a fortnight to a month. Comparatively, the earlier the operation the better, for any check to the lamb's recovery is progressively greater as the age increases.

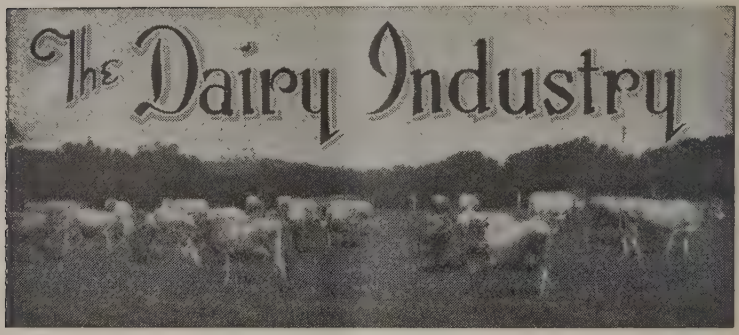
All instruments and knives to be used should be carefully disinfected before commencing operations, and a container with an effective disinfectant should be handy for the purpose of frequent sterilization. Lamb marking should not be continued until late in the day, so that there is plenty of time for the ewes and lambs to "mother" before dark.

If the absence of flies permit, dressing of the wounds need not be practised; but if the presence of flies makes dressing necessary, the dressing should be both repellent to the fly and curative in its effect on the wounds.

WATER FOR CHEMICAL ANALYSIS.

Farmers and graziers who want water analysed are reminded that nothing less than a pint bottle (an ordinary beer bottle) of water should be sent in. Many still send specimens in tiny containers, such as aspro and essence of lemon bottles, without realising that they are only wasting their own time.

The requirements for sending in a water sample are a 26-oz. bottle (a pint beer bottle) of the water to be analysed, with the full name and address of the sender, and full particulars of the location of the water supply and of other relevant facts pasted on the bottle.



Balance in Dairy Farming.

R. E. WATSON, Division of Animal Industry.

A WELL-BALANCED dairy farm is an efficient dairy farm on which pasture land and cultivation are so divided that a maximum number of dairy stock are fed right up to carrying and production capacity at all times. Such farms are few, and every dairy farmer should give consideration to improving the balance of his farm.

Three considerations, all inter-related, enter into farm balance. They are:—

(*a*) Has the farm sufficient cultivation?

(*b*) Has the farm too much cultivation?

(*c*) Has the farm sufficient pasture land?

(*a*) To decide whether he has sufficient cultivation, a farmer should ask himself—

(i.) Can he supplement dry pasture with green fodder crops at all times it is necessary to do so?

(ii.) Can he feed his stock to production capacity on cultivation at all reasonable times when pasture is not available?

Or—

(iii.) Can he conserve sufficient fodder and concentrates to feed his stock to capacity when neither pasture nor green fodder crops are available, and over and above this, can he maintain sufficient reserves of conserved fodder to tide over any reasonable drought?

(iv.) Can he grow sufficient supplementary crops for his pigs?

(*b*) Most dairy farmers would never agree that a dairy farm can have too much cultivation, and yet such is often the case.

The following considerations are the slide-rule by which excess cultivation can be measured:—

(i.) Wastage of crops and fodder due to an excess over all reasonable requirements for feeding and conservation.

(ii.) Insufficient labour to properly work all cultivation in the time available between milkings.

(iii.) Insufficient farm implements, petrol, horses, &c., to work cultivation in time available.

The disadvantages of too much cultivation are:—

(i.) Badly worked cultivation and possible crop failures owing to the effort to work excess cultivation.

(ii.) Conservation of fodder as ensilage neglected, owing to insufficient time and labour, due to the demands of cultivation. Harvesting of grain crops and hay is mostly carried out, but only to the neglect of cultivation.

(iii.) Neglected cultivation, in most cases, grows weeds. This only lessens available pasture, and is a nursery for noxious weeds.

For these reasons no farmer should break up additional cultivation until he has fully considered whether he can work it properly and efficiently. A good farmer will always remember that one acre well worked is worth two or three acres badly or insufficiently worked and is much more economical in seed. Furthermore, should a farmer have unused cultivation land, he should replant with suitable grasses instead of, as is usually the case, allowing it to remain unused and neglected—a liability rather than an asset.

(c) A dairy farm should have sufficient pasture land to feed all dairy stock at full production capacity for the longest possible period, with the least possible help from cultivation or conserved fodders. Some concentrates will need to be fed to cows on pasture beyond its maximum nutritive stage (that is, over 8 inches high) for full production; the addition of such concentrate is to utilise more efficiently the available pasture.

In conclusion, as all three considerations are inter-related, they must be treated as one problem, and the only correct solution is one which embraces and solves the three factors as one. Some farmers have succeeded in their efforts to obtain a balanced dairy farm, and they have found, as will others, that they are able to feed more stock and produce more dairy produce with less work.

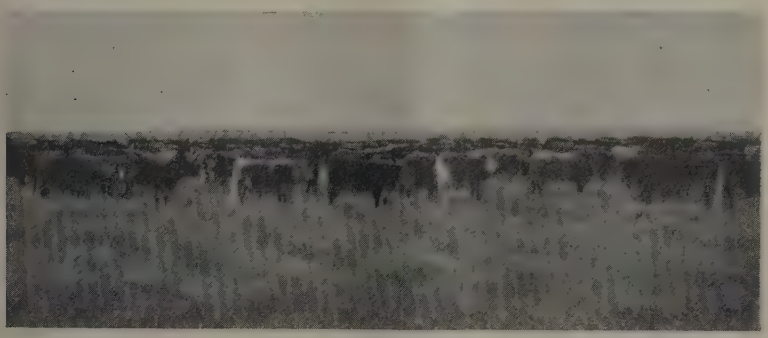


Plate 38.
ON CONDAMINE PASTURES, DARLING DOWNS.

Evaporation of Water from Dams.

A MURGON correspondent has asked for information on how to minimise evaporation of water from dams during hot, dry weather. Mr. F. G. Few, Dairy Technologist, advises:—

The natural rate of evaporation from the surface of a dam of water depends on the surface area and on the local weather conditions throughout the year. The most important factors governing the rate of evaporation are temperature, humidity, and prevailing winds. Average conditions in these respects enable the water loss to be evaluated for different districts in the State, and at Murgon the annual loss amounts to approximately 6 feet of depth. The absolute loss in cubic feet or gallons from any particular dam is proportional to the surface area, while the actual capacity of the dam is the product of the surface area and the average depth. As the rate of evaporation does not involve the depth, the construction of a relatively deep dam is advisable wherever possible. These facts can be illustrated by considering two dams with the same surface area, the depth of one being twice that of the other. The deeper dam holds twice the quantity of water but loses only the same amount by natural evaporation as the shallower. As a result the percentage loss is only one-half and the deeper dam will contain water for double the time under adverse weather conditions. It is true that contractors very often raise objections to making deep dams, but in all cases it is preferable to make a dam as deep as possible (having regard to the nature of the sub-soil, &c.) for any required capacity, rather than to obtain such capacity by constructing a relatively shallow dam with a much larger surface area.

Once constructed, however, the rate of loss by evaporation is rather difficult to offset. The use of heavy oil which spreads out over the surface in a thin film will tend to offset evaporation, but the cost of so doing must always be taken into consideration. As the oil is located solely on the water surface it does not spoil the water for its ordinary uses, provided the supply is taken from well below the surface. Any heavy rain, such as an occasional storm, may result in the oil being lost if the dam overflows, but this is not of great importance if oil is only used when the dam is well below the overflow level. The advisability of using oil is thus purely a personal matter, having regard to the value of the water on hand and the relative cost of the oil. Only sufficient should be used to just cover the surface, and a little experience will soon enable the required amount to be determined.

The growing of aquatic plants, such as water lillies, &c., has also been tried, but no actual saving has been proved, as apparently the saving in evaporation from the water surface is offset by the loss in evaporation from the plants (transpiration).

Finally, if oil is used on the surface of a dam all stock should be kept from direct access to the water, and care should be taken to pump from well below the surface to avoid oil contamination of the water, especially for dairy or horticultural use.

Dirt in the Dairy.

DAIRY inspections usually confirm the observance of the ordinary rules of sanitation on dairy premises. However, there are some things which are almost invariably overlooked. These are the cleansing of:—

1. Hand rails for opening bail doors.
2. Milking stools.
3. Leg ropes and breeching ropes or chains.

The cleansing of these units of milking shed equipment may seem to some of relatively little importance. However, in actual fact, it is equally important that they be kept as clean as the floor of the milking bails. This is so because contamination of milk from these appliances may be actually conveyed by the milker's hands after handling them.

Hand rails or pushrods for opening the bail doors are often covered with an accumulation of dirt or germ-laden dust. It takes some weeks for an accumulation such as this to accrue, but it should be remembered that a little more is being added from the milker's hands each time the bails are opened, and unless attention is given to it this will always remain a potential source of contamination of milk. It is quite obvious how this contamination may come about. The milker lets the cow out of the bails and then immediately milks the next cow, after having handled this rail. As it is often difficult to avoid milk occasionally contacting the milker's hands, this contamination is consequently washed into the milk bucket.

A similar thing occurs with milking stools, leg ropes and breeching ropes. These appliances are often splashed with cow manure, &c., and are also handled by the milker before he commences milking.

These seemingly unimportant factors should be regarded in their true relationship to milk quality, and every endeavour made to have such appliances regularly scrubbed and cleaned.—C.R.T.

Plate 39.

A Dairy Building Built According to a Plan Supplied by the Department of Agriculture and Stock.—Mr. W. G. Murphy's property at Crawford, near Kingaroy.

The Milking Machine.

(Supplied by the Division of Dairying).

AS in every other branch of dairy practice, there are rules for running a milking machine, and by sticking to these rules a lot of worry and loss of time and temper can be saved.

In the working of a milking machine, there are four fundamental rules to be strictly observed:—

1. Avoid a high vacuum.
2. Adjust the relief valve to blow off at 14 to 15 inches, or lower if possible.
3. Remove the cups from the cow as soon as the milk ceases to flow.
4. Do not wait until inflation (or rubbers) burst before replacing them when replacements become necessary.

If these rules are disregarded a heavy penalty has to be paid. Excessive vacuum, and the bad practice of leaving the cups on cows after the milk has stopped flowing, are among the most serious causes of udder disorders in machine-milked cows.

The milking machine is often blamed for udder troubles when the real cause is faulty operation of the machine. In other words, the dairy worker himself is often to blame, either through his own carelessness or lack of knowledge, for udder disorders in machine-milked cows. Therefore, the man, not the machine, is usually the culprit.

The normal working vacuum of a releaser plant in good order is 14 to 15 inches. The higher the reading, the greater the suction on the cow. The suction of the vacuum is provided by the pump, measured by the vacuum gauge, and controlled or limited by the relief valve. The purpose of the relief valve, which is, of course, adjustable, is to prevent the vacuum rising to a dangerous level.

Although the relief valve is spoken of as "blowing off," it really works in the opposite way; it allows air to be sucked into the pipes when the vacuum rises above the valve setting.

There is a lower as well as an upper limit to the vacuum. The cups are, of course, held on to the cow by suction only, and a certain amount of vacuum is necessary to keep them in position. Then, too, the degree of vacuum determines, within limits, the rate of milking.

The operator may be tempted to push the vacuum beyond 15 inches by screwing down the relief valve for one or two reasons, either because of the cups dropping off the cows, or because of slow milking. If the vacuum is pushed beyond 15 inches, trouble may be expected.

Experienced dairy workers are not always satisfied to accept the readings of the vacuum gauge. That is fair enough, for a gauge, even though it was quite accurate when installed, may get out of adjustment. Some gauges have been found to be as much as 2 or 3 inches out. So it is wise to have the gauges tested at least twice a season; the adjustment of a gauge is quite an easy job, and the district dairy adviser will gladly show, if necessary, the way to go about doing the job.

It is a good idea to mount the gauge and relief valve side by side on the same pipe, with a tap between the machine and the pipe. At the end of the milking, and before the plug is withdrawn from the end

of the milk pipe, this tap is closed. It prevents the hand of the gauge from banging hard against the stop and knocking itself out of adjustment.

It is suggested that all relief valves should be taken to pieces and cleaned out at the beginning of each season. A drop of oil should be put on the stem each week. Regular lubrication of the gauge with light machine oil also is advisable.

It is a serious mistake to believe that, because a given milking plant cannot maintain the "full" vacuum, or, rather, the complete vacuum when all cows are milking, the relief valve should be screwed down hard. The whole purpose of the valve is to limit the suction applied to the cow. If the machine cannot maintain a reasonable vacuum with the maximum load, there is probably a serious leaking of air into the plant, or, perhaps, the pump is too small for the number of milking parts in operation.

A correctly adjusted milking machine will not harm the udder of a cow while the milk is flowing; but irritations leading to a definite disorder may result if the cups are left on the cow long after the milk has ceased to flow.

Again, it is stressed that cleanliness in every dairy operation means bigger returns and greater satisfaction to all concerned. Cleanliness in the dairy means choice-grade cream in the butter churn and a fatter factory pay.

Specific Cases.

Here are a few actual experiences of milking machine operations which have been reported:—

On Farm No. 1 a third of the herd had developed mastitis (a term which can cover a multitude of udder troubles) within a month. In this herd, only a few isolated cases of mastitis had previously occurred. The dairy adviser was called in to examine the milking plant and the milking methods. He concluded that the dairy was short-handed, and that meant that the cups were left on the cows too long; that the man in charge did not know much about the machines; that the inflations (or rubbers) had perished (they had not been changed for four months, except for one which had burst); that the rubber joints of the pulsator system were leaking; and that the vacuum gauge was giving a wrong reading. Actually, the gauge was 4½ inches out, which meant that the milking plant was working up to 19¼ inches.

Having found out all these faults, the next thing to do was to test the findings, work out a remedy and observe the results. That was done. The plant was completely overhauled. Udder troubles in the herd dropped to the previous low level almost immediately.

On Farm No. 2 the herd consisted mainly of heifers that had been in milk for four months and were producing satisfactorily. Within a week twelve of them had developed mastitis. When the milking plant was inspected, it was found that the relief valve was sticking and that the vacuum had risen to a shade more than 17 inches. The valve was overhauled and set to "blow off" at 13 inches. In the succeeding 18 months no more udder troubles of any consequence occurred in this herd.

Farm No. 3 had a bad mastitis record, and over a term of years from 15 to 20 cows had to be culled every year. When the herd first came under the notice of the dairy technologists, half the number of cows in milk had mastitis. Usually the cows were quite sound for a fortnight after they had come in; then mastitis developed. Shortly

before the outbreak the milking machinery was overhauled by a mechanic, but without satisfactory results. The cups would not stay put, while the proportion of strippings was excessive. The remedy adopted by the farmer was to operate the machine with a vacuum of 17 inches.

Examination showed that the inflations (or rubbers) were in a bad condition, but the basic fault was a vacuum pump of inadequate capacity. The milking plant consisted originally of three units. Two other units had been added, giving the plant a five-cow capacity, without installing a larger pump and that, of course, resulted in serious overloading. A larger pump was put in and the machines made to work satisfactorily at the correct vacuum level. Cullings for mastitis in this herd were reduced 60 per cent.

Farm No. 4 had a herd of 65 cows. Little trouble from mastitis had occurred while an old type of milking machine was in use, but when a new plant was put in with a new type of releaser 29 cases of mastitis developed in the herd. The cause was located in the vacuum gauge, which was indicating 15 inches when the true vacuum was 17 inches, and in the relief valve which allowed the vacuum to mount to 20 inches when the units were closed down. Correction of both faults reduced the number of udder troubles. In the following season, only four cows out of 62 were culled for mastitis.

On Farm No. 5 it was revealed that rough hand-milking can cause udder troubles as easily as a badly-run milking machine. The machine in use was an old bucket type. In six years only six cows had been culled for mastitis. A new man was put on. Although no change was made in the operation of the machine, ten cases of mastitis occurred within a month. All the affected cows had been milked by the new man who was a very rough stripper. Udder troubles ceased soon after he got the sack.

On Farm No. 6, within a fortnight 17 cases of mastitis had developed in a dairy herd of 40 cows. The farmer put the cause down to a cold snap which coincided with the outbreak, but the dairy adviser thought otherwise. Going through the dairy premises, it was found that the milking plant was in fair order, but the vacuum used was 16 inches. Moreover, all the affected cows were milked by one man who was slow and careless. He invariably left the cups on the cows for two or three minutes longer than the cups should have been kept on, and propped the cups up hard. The other man was careful, and, when unable to keep up with the cows, simply hung up the cups until he caught up. Both faults were corrected and the incidence of mastitis in this herd soon dropped.

On Farm No. 7, after the usual examination, or, rather, a special inspection of the milking plant, it was found that a fault in the releaser was the cause of trouble. The gauge showed a vacuum of 15 inches, yet the machine was a very slow milker and the quantity of strippings ridiculously large. The gauge was tested and found accurate; the relief was in good order, and the pulsator rate was about right. An inspection of the pulsator line showed, however, that it was being flooded with milk as the result of a leaky outer flap on the releaser. When the rubber ring on the flap was renewed, the trouble disappeared. The real cause of the slow milking was the weak pulsation due to choking by milk, and an abnormally large vacuum drop when the milk was flowing.

Care in Operation.

The foregoing leads up to the point that a milking plant, like all other machinery, calls for care in its operation. Every dairy farmer knows that the successful working of a milking machine depends on the care and time given to keeping it in good order. Any neglect in keeping a milking plant clean is soon shown in butter or cheese factory grade returns.

There has been no improvement yet on the boiling water and caustic soda method of cleansing a milking machine. The best thing to do is to adopt a regular routine system and then see that the job is always done thoroughly. The essential requirements are a steam sterilizer for boiling water and providing steam, caustic soda, a scrubbing brush, and a pipe-travelling brush and plenty of clean water.

As a reminder, here is the routine making eight simple, clear, and definite rules to stick to:—

1. After use, rinse each unit of the milking machine with at least *one* gallon of clean, cold water.
2. Through the milk system of the machine run a boiling, dilute caustic soda solution, using 1 gallon of the boiling solution to each set of teat cups. The solution consists of 1 tablespoon of caustic soda to 4 gallons of *boiling water* (the water must be boiling).
3. Run plain *boiling* water through each set of teat cups, using at least *one* gallon (preferably two) of boiling water for each unit. Sterilize the milk system of the machine with steam from the sterilizer, and dry by drawing air through the system.
4. Clean the air lines once every day in the same way as for the milk system, using the same soda solution and clean boiling water.
5. Remove and dismantle the releaser and vacuum tank, wash each thoroughly, sterilize with steam and leave to drain in a dust-free place.
6. Disconnect teat cups and rubbers, and, together with all rubber plugs, immerse in lime water. The lime water should be changed regularly—every second day at least. This regular changing of lime water is a very important point. Open up all flaps in the milk lines.
7. Dismantle the milking machine completely and clean and sterilize it at least once a week.
8. Just before each milking flush the milk system with clean, cold water containing a chlorine compound in the proportion indicated on the label on the package.

Clean milk means high-grade cream; high-grade means choice butter and better returns to the dairy farmer.

The moral is to see that milking machines are kept in good running order and that correct methods of dairy practice are carefully observed.

The district dairy adviser is always happy to right things when they go wrong, but happier still when he can help in keeping them going right, especially at the present time when dairy products are needed so urgently to feed a hungry world.

PRODUCTION RECORDING.

List of cows and heifers, officially tested by Officers of the Department of Agriculture and Stock, which qualified for entry into the Advanced Registers of the Herd Books of the A.I.S., Jersey, and Ayrshire Societies, production records for which have been compiled during the month of June, 1945 (273 days' production unless otherwise stated).

Name of Cow.	Owner.	Milk Production.	Butter Fat.	Sire.
		Lb.	Lb.	
AUSTRALIAN ILLAWARRA SHORTHORN.				
Mature Cow (Standard 350 lb.).				
Alfa Vale Eveline 5th	W. H. Thompson, Nanango	11,716·5	495·751	Penrhos Pansy's Pride
Sunlit Farm Ilma 2nd	W. H. Sanderson, Mulgeldie	9,903·3	363·513	Sunlit Farm King Billy
Senior, 4 Years (Standard 330 lb.).				
Alfa Vale Princess	W. H. Thompson, Nanango	9,991·4	458·374	Penrhos Pansy's Pirde
Corunna Stella	A. Webster, Helidon	8,753·75	363·365	Braemar Foaming
Junior, 4 Years (Standard 310 lb.).				
Trevlac Columbine	W. A. Freeman, Rosewood	9,822·5	379·35	Newstead Combination
Trevlac Colleen	W. A. Freeman, Rosewood	8,687·75	331·727	Newstead Combination
Junior, 3 Years (Standard 270 lb.).				
Trevlac Lurlene	W. A. Freeman, Rosewood	9,330·	352·137	Trevlac Supreme
Trevlac Pansy	W. A. Freeman, Rosewood	9,333·5	346·709	Trevlac Supreme
Rhodesview Carnation 19th	W. Gierke and Sons, Helidon	7,448·25	322·316	Blacklands Prospector
Bunya View Maiaida 2nd (258 days)	W. Caldwell, Bell	6,300·92	304·312	Trevor Hill Reflection
Senior, 2 Years (Standard 250 lb.).				
Alfa Vale Pansy 2nd	W. H. Thompson, Nanango	10,728·25	465·402	Alfa Vale Model's Reward
Rhodesview Fanny 50th	W. Gierke and Sons, Helidon	6,938·4	295·119	Rhodesview Pilgrim
Rhodesview Handsome 6th	W. Gierke and Sons, Helidon	6,215·7	282·325	Fairvale Major
Rhodesview Lincoln 4th	W. Gierke and Sons, Helidon	6,566·2	282·052	Fairvale Major
Junior, 2 Years (Standard 230 lb.).				
Bantry Rose	D. Sullivan, Pittsworth	8,473·67	325·846	Penrhos Blossom's Prince
Valera Sally 5th	Sullivan Bros., Pittsworth	7,240·22	316·503	Alfa Vale Pride 2nd
Bunya View Dahlia	W. Caldwell, Bell	7,866·17	315·251	Trevor Hill Reflection
Valera Nancy	Sullivan Bros., Pittsworth	7,303·47	300·257	Rosenthal Surplus 4th
Silver Glen Fairy Star	V. R. Nugent, Murgon	7,469·7	293·31	Aynsley Victory
Arolla Beauty 5th	J. Crookey, Allora	6,945·	288·867	Parkview Highbrow
Arolla Beauty 4th (223 days)	J. Crookey, Allora	6,510·	283·762	Parkview Highbrow
Sunlit Farm Rosaline 4th	W. H. Sanderson, Mulgeldie	6,627·15	278·315	Sunlit Farm Spiders Emblem
Trevor Hill Rebecca 2nd	A. H. Webster, Helidon	7,146·3	277·167	Balater Czar
Penrhos Elva 13th	A. H. Webster, Helidon	6,594·5	267·039	Penrhos Pansy's Prince
Silver Glen Marie	V. R. Nugent, Murgon	7,274·15	265·725	Aynsley Victory
Yarranvale Model 3rd	W. Henschell, Yarranlea	6,862·62	259·705	Trevor Hill Bosca
Trevor Hill Iris 5th	A. H. Webster, Helidon	5,846·4	253·419	Balater Czar
Valera Roseleaf 13th	Sullivan Bros., Pittsworth	5,571·7	238·583	Alfa Vale Pride 2nd

JERSEY.

Mature Cow (Standard 350 lb.).

Brooklands Royal Chimes	N. C. Webb, Beaudesert	9,103·7	471·834	Retford Earl Victor
Brooklands Royal Babette	N. C. Webb, Beaudesert	8,454·15	438·463	Retford Earl Victor
Brooklands Sultans Lillian	N. C. Webb, Beaudesert	9,736·75	416·113	Brooklands Royal Sultan

Junior, 4 Years (Standard 310 lb.).

Brooklands Primrose	W. S. Conochie, Sherwood	6,688·65	316·84	Brooklands Padishah

Senior, 3 Years (Standard 290 lb.).

Oxford Maid Marion	Burton Bros., Wanora	8,868·52	488·278	Oxford Ajax
Ashview Treasure (255 days)	C. Huey, Sabine	5,326·25	300·211	Trecarne Butter Queens Officer

Junior, 3 Years (Standard 270 lb.).

Strathdean Deanna	S. H. Caldwell, Bell	7,251·74	488·642	Navua Ladora's Ruler
Mayfair Beauty 5th	J. W. Carpenter, Helidon	6,493·95	411·437	Trecarne Golden King 2nd
Trecarne Rose Marie 3rd	C. Huey, Sabine	5,424·55	364·097	Jerseylea Golden Duke
Ashview Pattibell	C. Huey, Sabine	6,162·45	275·844	Trecarne Victor 4th

Senior, 2 Years (Standard 250 lb.).

Mayfair Duchess	J. W. Carpenter, Helidon	5,825·6	361·283	Trecarne Golden King 2nd
Boree Countess	W. and C. Tudor, Branch Creek	5,644·46	310·22	Maurfield Larkspur's Gift
Wyalla Destiny	C. Huey, Sabine	6,379·75	302·364	Wyalla Creole's Butterboy
Boree Tinklebell	W. and C. Tudor, Branch Creek	5,894·85	295·417	Maurfield Larkspur's Gift
Ashview Madeiraette	C. Huey, Sabine	5,282·3	287·886	Trecarne Victor 4th
Trecarne Princess 6th	P. H. Schull, Oakey	5,033·75	270·13	Treacrne Some Duke

Junior, 2 Years (Standard 230 lb.).

Glenrandle Jean	P. Kerlin, Killarney	7,526·9	436·114	Bellgarth Stylish
Glenrandle Handsome Lady	P. Kerlin, Killarney	6,410·3	368·622	Bellgarth Stylish
Glenrandle Nisa 2nd	P. Kerlin, Killarney	6,936·7	354·467	Bellgarth Stylish
Mayfair Beauty 6th	J. W. Carpenter, Helidon	5,068·45	312·402	Trecarne Golden King 2nd
Trecarne Jersey Lass 4th	J. J. Ahern, Conondale	6,169·2	303·1	Trecarne Some Duke
Hocknell Bravo Fleur	N. C. Webb, Beaudesert	5,734·2	302·449	Nauva Victoires Lad
Wyalla Marygold	C. Huey, Sabine	5,533·5	271·517	Wyalla Creoles Butterboy
Wyalla Princess (255 days)	C. Huey, Sabine	4,519·85	271·387	Wyalla Creoles Butterboy
Woodview Ladyette	P. H. Schull, Oakey	4,790·85	265·383	Trecarne Royal Officer

AYRSHIRE.

Junior, 4 Years (Standard 310 lb.).

Crescent Farm Bellona	N. J. Mann, Broxburn	8,307·59	341·481	Crecsent Farm Statesman

Junior, 3 Years (Standard 270 lb.).

Leafmore Pansy 2nd	J. P. Ruhle, Motley	7,457·8	310·648	Myola Jellicoe

Senior, 2 Years (Standard 250 lb.).

Leafmore Jinx	J. P. Ruhle, Motley	6,865·3	256·137	Leafmore Jellnor Skipper

PRODUCTION RECORDING.

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Name of Cow.	Owner.	Milk Production.	Butter Fat.	Sire.
		Lb.	Lb.	
AUSTRALIAN ILLAWARRA SHORTHORN.				
SENIOR, 4 YEARS (STANDARD 330 LB.).				
Valera Sally 4th	Sullivan Bros., Pittsworth	9,418·83	393·356	Penrhos Blossoms Prince
JUNIOR, 4 YEARS (STANDARD 310 LB.).				
Ennismore Bud	E. W. Jackson, Nobby	8,486·75	328·267	Navillus Prince Henry
SENIOR, 3 YEARS (STANDARD 290 LB.).				
Valera Dairymaid 2nd	Sullivan Bros., Pittsworth	8,463·18	302·077	Valera Daphne's Prince
JUNIOR, 3 YEARS (STANDARD 270 LB.).				
Valera Roseleaf 10th	F. B. Sullivan, Pittsworth	9,920·01	366·76	Rosenthal Pendant's Prince
Valera Pearlie	Sullivan Bros., Pittsworth	9,442·64	343·456	Rosenthal Pendant's Prince
Ardilea Plum 3rd	H. W. Hinrichsen, Clifton	7,799·25	331·935	Newstead Reliance
College Rascal 14th	Queensland Agricultural High School and College Lawes	8,834·65	331·64	Sunnyview Alert
Ennismore Fuchsia	E. W. Jackson, Nobby	7,717·25	312·898	Navillus Prince Henry
Ennismore Bud 2nd	E. W. Jackson, Nobby	7,620·75	283·232	Navillus Prince Henry
SENIOR, 2 YEARS (STANDARD 250 LB.).				
Trevor Hill Snowflake 2nd	G. Gwynne, Umbiram	7,942·68	340·11	Rosenthal Musketeer
Ennismore Fanny	E. W. Jackson, Nobby	6,343·75	261·156	Navillus Prince Henry
JUNIOR, 2 YEARS (STANDARD 230 LB.).				
Happy Valley Elaine	R. R. Radel, Coalstoun Lakes	6,548·01	259·81	Sunnyview Warden
Trevor Hill Maple 4th	A. H. Webster, Helidon	6,717·1	254·069	Balater Czar
Palmetto Lady Satin	R. Tweed, Kandanga	6,289·65	252·218	Sunnyview High Caste

GUERNSEY.

Mature Cow (Standard 350 lb.).

Laureldale Dot (246 days)	W. A. K. Cooke, Witta	7,174·61	382·89	Laureldale President

Junior, 3 Years (Standard 270 lb.).

Willowbrae Poppy	A. S. Cooke, Maleny	9,545·45	437·88	Linwood Peace Boy
Linwood Genista	A. S. Cooke, Maleny	7,471·7	361·159	Warrawong Winter

Senior, 2 Years (Standard 250 lb.).

Linwood Sunset	A. S. Cooke, Maleny	6,709·7	327·303	Warrawong Winter

Junior, 2 Years (Standard 230 lb.).

Linwood Parasol	A. S. Cooke, Maleny	7,057·49	299·452	Warrawong Winter

JERSEY.

Senior, 4 Years (Standard 330 lb.).

Connemarra Blanche	J. Ahern, Connondale	7,544·4	400·042	Trinity Counsel

Junior, 3 Years (Standard 270 lb.).

Windsor Lady Deanna	Johnson Bros., Gleneagle	8,790·35	374·8	Brooklands Sultan's Victory
Oxford Sandra	Burton Bros., Wanora	6,954·54	357·358	Oxford Daffodil's Count
Westbrook Golden Daisy 2nd	Queensland Agricultural High School and College, Lawes	5,944.0	305·796	Oxford Asters Lad

Senior, 2 Years (Standard 250 lb.).

Carnation Royal Victorious	W. Muller, Marburg	4,939·5	311·745	Inverlaw Royal Victory
Trecarne Jersey Bell 2nd	P. H. Schull, Oakey	5,236·95	270·316	Brampton Daffodil's Peer

Junior, 2 Years (Standard 230 lb.).

Oxford Francis 3rd	Burton Bros., Wanora	7,076·25	338·629	Oxford Brown Victory
Oxford Auburn Lass	Burton Bros., Wanora	5,739·5	294·251	Oxford Mighty Ajax
Lermont Queen	J. Schull, Oakey	4,899·5	292·353	Selsey Samares Hallmark
Lermont Faith	J. Schull, Oakey	5,294·9	281·012	Selsey Samares Hallmark
Lermont Maggie	J. Schull, Oakey	5,354·6	280·471	Selsey Samares Hallmark
Woodview Lily	P. H. Schull, Oakey	4,145·65	278·08	Trecarne Royal Officer
Kathleigh Dairymaid 2nd	W. Muller, Marburg	5,069·0	275·55	Oxford Daffodil's Victor
Trecarne Some Eileen	T. A. Petherick, Lockyer	4,833·95	262·661	Trecarne Some Duke
Tralee Buttergirl	W. Muller, Marburg	4,467·0	232·439	Romsey Prince Victor

Plate 40.
On the Brisbane River, near Wivenhoe Crossing.

Plate 41.
The Condamine near Yandilla.—The sheep in the picture are portion of a crossbred flock from which 110 per cent. of lambs were marked.

ANIMAL HEALTH

Bleeding Bail.

MARSHALL IRVING, Divisional Veterinary Officer.

IN response to frequent requests for plans and specifications of a crush-bail suitable for bleeding, dehorning, and other operations, the accompanying plans have been drawn up.

The bail, as illustrated, is of very strong construction and capable of handling all classes of cattle (beef or dairy). For dairy cows a similar design using lighter materials would suffice. A small forcing pen is all that is required for dairy cows to facilitate efficient operation.

A bail of this type with a small forcing pen would enable one operator with two assistants to bleed dairy cattle at a rate of over 45 per hour. With a good bail and crush and four assistants beef cattle can be bled at over 60 per hour.

The design has been selected for its simplicity of construction. Many improvements can be suggested—sloping sides, concrete floor, &c.—but the bail as shown can be easily erected and is adequate for bleeding purposes.

The design is a modification of a bail constructed by Mr. Max Hamlyn, of Canning Downs South, via Warwick, by whose courtesy the plans are published. The modifications adopted simplify construction.

THE KEEPING OF FARM ACCOUNTS.

In the business of farming, as in any other commercial enterprise, the keeping of accounts is a necessity.

An accurate system of bookkeeping, besides showing the results of trading operations, will enable a farmer to see his exact financial position and to say definitely what he is worth at a particular date; what he owes; what is owing to him; and whether he is gaining or losing.

To meet the need of a simple system of keeping farm accounts, the Department of Agriculture and Stock has published a handy brochure on farm bookkeeping. A copy may be had free of charge on application to the Under Secretary, Department of Agriculture and Stock, Brisbane.

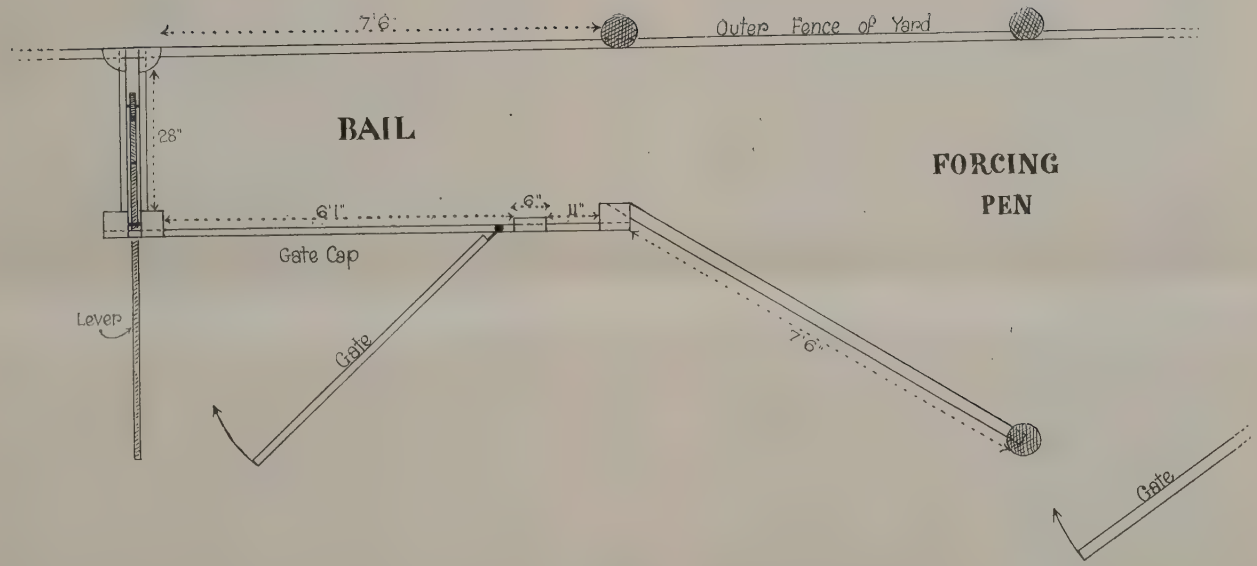

Plate 42.
GROUND PLAN OF BAIL AND FORCING PEN.

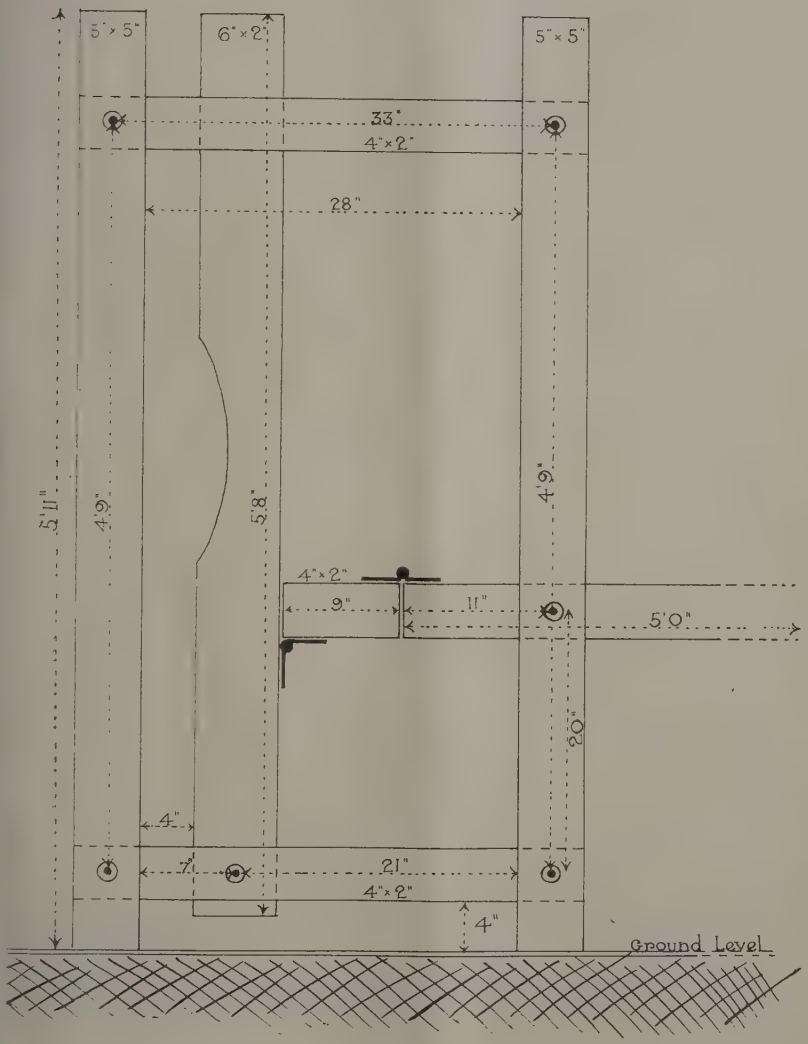

Plate 43.
FRONT ELEVATION OF BAIL, WITH BAIL CLOSED.

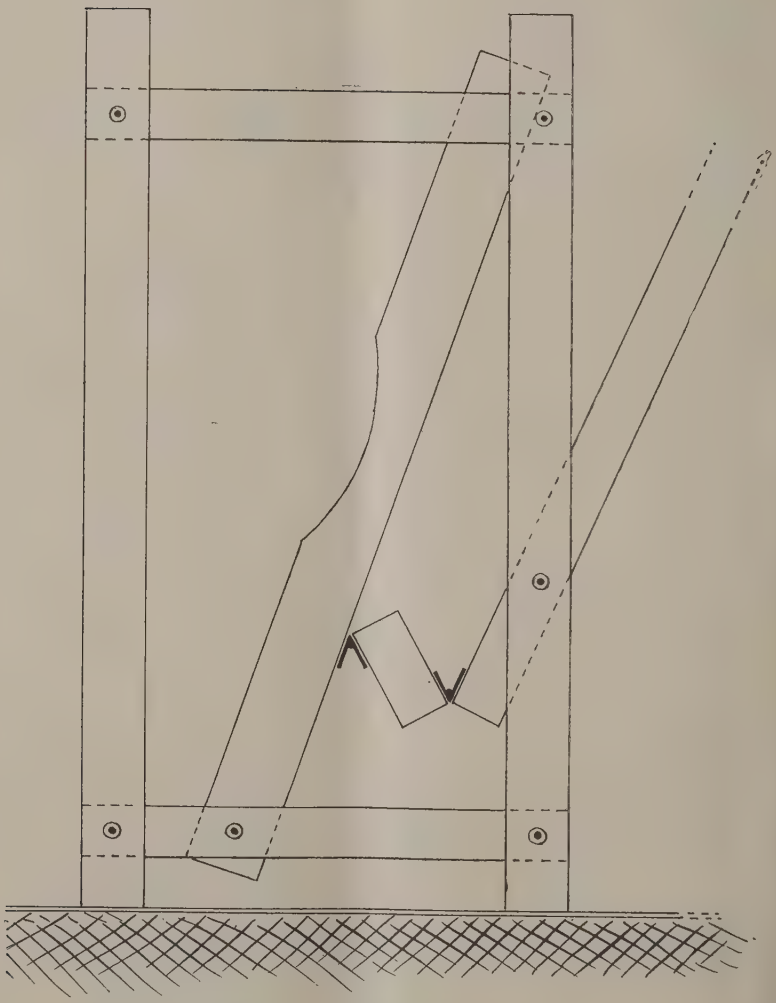

Plate 44.
Front Elevation of Bail, with Bail Open.

Plate 45.
Side Elevation of Bail.

Sanitation in Pig Raising.

F. BOSTOCK, Officer in Charge, Pig Branch.

IT may seem unusual to associate sanitation with piggeries, especially as the pig has been so long regarded a filth-loving animal. The fact that many pigs live and thrive in filthy pens, would seem to justify a general belief that the pig is a dirty animal. In pig raising, however, few principles are of greater importance than those of sanitation.

It is a common custom to place the piggery anywhere so long as it is out of sight, the sty very frequently being built of second-hand bush timber. Often the pigs are enclosed in small yards in low-lying situations, with the result they get little exercise and the enclosure soon becomes a quagmire in which the animals sink to their bellies and are exposed to dampness, cold, draughts and, in summer, sweltering heat.

Young Pigs Need Extra Care.

Probably there is no other time when pigs need more care and better treatment than when they are being weaned. As a rule the disease-resisting powers of young pigs are low. While certain classes of bacteria are beneficial, others cause many ills both of animals and plants. In general, bacteria require certain conditions for their existence and growth. The temperature requirement varies, but a high temperature, such as boiling water, is very destructive to all bacterial life. Cold does not appear to have as great an influence as heat, but as a rule it may be said that the range of temperature for the most favourable growth and multiplication of bacteria liable to affect pigs is from 100 degrees to 110 degrees F.

Moisture is necessary for bacterial growth, although germs may exist for some time in dry dusty places, apparently more or less dormant. Few bacteria that can resist the direct rays of sunlight.

Why Cleanliness is Essential.

Many disease-producing germs will not develop or multiply outside the particular animal which they affect; they may exist for some time in the soil, water, bedding, or litter in the pens and yards. This is one reason why thorough disinfection is necessary.

The pig, in common with all other animals, possesses varying powers of germ resistance which may be greater in one pig than in another, but, as a rule, the younger the pig the lower its resisting powers. However, even if the resistance is low the disease-producing germs must be introduced into some favourable spot for development, such as

inflamed or irritated membranes of the mouth, bruises, and cuts. Under healthy conditions, the introduction of only a few germs may not produce a disease; if, however, a great number is introduced the pig's resistance is eventually overcome and disease follows. If by poor feeding, either in amount or composition, bad housing, poor ventilation, allowing pigs to catch cold, lack of exercise, or any other weakening influence, the pig's vitality is lowered, a much smaller number of germs may produce a disease. If on the other hand we are able to keep the pig's powers of resistance at their highest by good housing and sanitary conditions, many of the ills that usually affect them will not occur.

Cheap Disease Insurance.

Frequent disinfection keeps the number of bacteria at a low level, while careful management keep the pig's vitality at a high point, so that they are better able to resist any germ invasion. Increased resistance due to proper management is the cheapest protection against disease.

It is of much greater importance to the pig-raiser to know how to prevent disease than it is to know how to treat the animals after they become sick. Any sick pig, even though it recovers, has its normal development retarded, thus reducing the margin of profit.

Only constant watching on the part of the farmer can guard against attacks of disease, only by continually waging war upon disease producing germs can the best results be obtained. The natural method of checking the growth and multiplication of harmful germs is to prevent as far as possible the conditions favourable for their growth and maintenance. Cleanliness should be insisted on and all dark corners should, if practicable, be exposed to sunlight. Dry quarters are much more sanitary than damp ones, because the conditions for germ development are less favourable. Frequent cleaning and disinfecting of all sleeping quarters, pens and yards are very necessary, and dry well-drained feeding floors very desirable, as pigs should not be expected to pick their food out of a mud wallow.

Importance of Pure Drinking Water.

As a necessary precaution against the growth of germs and consequent repeated invasions, the water intended for the pigs should be pure, water troughs should be kept clean and no opportunity allowed for the pigs to drink from muddy, scummy pools or wallows.

If some means of cooling other than shade is necessary, artificial wallows made of concrete should be used, as these can be kept clean at a minimum of expense. Farmers take great risks at all times in allowing their pigs to wallow in a running stream, unless they know definitely that there are no other piggeries further up-stream. In no circumstances should the dumping of dead pigs, bedding, or other litter into the stream be allowed.

Disinfectants.

In addition to checking the growth of harmful germs by making conditions unfavourable for their development, the actual killing of the germs by use of disinfectants is strongly advocated, and is necessary in controlling disease.

As before stated, direct sunlight is a very powerful disinfectant, and has the added advantage of costing nothing. When shielded from the

direct rays of the sun and protected against the effects of disinfectants by being covered by mud, dust, manure, straw, or other litter, many disease-producing germs are capable of existing for long periods of time. Any shelter used in housing pigs should therefore be built, or if already built, should be altered to allow all the sunlight possible to enter. The frequent cleaning and exposing to the sun of feed and water troughs will naturally suggest itself as a means of preventing the spread of disease germs in these places.

Direct Contact Essential.

There are several chemical disinfectants which will destroy germs when brought into direct contact, so care must always be taken to see that direct contact is established. For this reason the thorough cleaning of pig houses, the removal of false floors and the forcing of disinfectants into all cracks, corners, and crevices of the buildings are very important.

Among the proved disinfectants may be mentioned caustic soda, and boiling water (5 lb. caustic soda to 10 gallons boiling water), also a 3 to 4 per cent. water solution of a reliable coal tar disinfectant.

Two fairly good disinfectants are common lime and chloride of lime. Their principal use in a disinfecting solution is to furnish a basis of a whitewash, so that it may be determined where the spray is going and whether or not any small patches are being missed.

Method of Disinfecting.

In view of the fact that it is sometimes difficult, and always somewhat laborious, even under the best of conditions, to keep pig houses and small pens free from infection, the practice of inducing the pigs to live as much as possible out of doors should be observed. No place offers more advantages from the point of view of sanitation than does clean pasture.

The frequency with which pig shelters and pens should be cleaned and disinfected is governed by the weather, time of year, and number of pigs in any particular place. In damp, cold weather, the bedding becomes wet and filthy in a very short time, and cleaning is necessary perhaps several times a week.

When cleaning pig houses and yards, the bedding, manure, or other litter should be removed and if practicable scattered thinly over a paddock in which there are no pigs. If allowed to remain in the yards the pigs will root and work over the litter, rendering the cleaning process of little value.

Feeding floors should be cleaned frequently so that the feed will remain clean until eaten, or, if no floor is provided, the trough should be moved to a new position each day, so as to avoid the possibility of a puddle hole being formed, which is usually the case when feeding is carried out on one spot for some time.

A large number of pigs kept in a small area necessitates constant care in keeping their quarters clean. Many farmers would have better success with their pigs with less work if the pig yards were larger and afforded more range; all diseases appear oftener and flourish better in crowded places.

It is always safer to clean a litter too often than not often enough, cleanliness being one of the first principles in pig raising.

Spray Pump Available.

A powerful spray or bucket pump and a reliable water solution of some coal tar disinfectant with enough lime added to make a thin whitewash are the best means of combating infectious diseases likely to affect pigs. It should always be remembered that it is only after thorough cleaning that efficient disinfection can be done. The use of a pump is advisable, since the disinfecting spray should be forced into all cracks and crevices; an efficient job cannot be done by using a brush or scattering a few lumps of lime in a pig house or yard. Care should always be taken to see that all surfaces which are not exposed to direct sunlight are thoroughly sprayed.

Chloride of lime may be used in the disinfection of bedding, manure and other refuse and should be thoroughly mixed with the material to be disinfected. A safer method, where practicable, is to burn all straw after it has been scattered thinly over some paddock to which pigs do not have access, and the residue should be exposed to the sun for a month or more before being ploughed under.

Filth Favours Parasites.

Many of the same conditions which favour the presence and development of germs are also favourable for the development of worms, lice, and mange. These parasites are important factors in lowering the vitality and disease-resistance of pigs. While they do not cause many deaths, they pave the way for the invasion of disease-producing germs. Because of the weakened condition of the pigs, these germs meet with slight resistance and many deaths may result which could otherwise have been prevented.

Most attacks of pneumonia may be put down to the exposure of weakened pigs, while low vitality may be attributed to bad housing, poor food, attacks of worms, lice and bacteria. Strong vigorous pigs in good quarters rarely suffer from pneumonia.

The same measures employed in destroying germs destroy lice and worms. The disinfection of sleeping quarters, yards and troughs kills great numbers of lice which may for the time being be off the pigs, and a part of the life cycle of intestinal worms is spent outside the animal's body. Therefore, clean pastures, water troughs, feeding floors and utensils and their careful disinfection will undoubtedly destroy many immature worms before they enter the pig's body.

Summary.

Most diseases in pigs are caused directly or indirectly by bacteria, lice and worms.

Sanitation amounts to continued war on bacteria and conditions favourable to their maintenance or growth.

The healthier the pigs the more rapid and more economical are their gains in live weight.

Keep pigs healthy by:—

1. Keeping yards and runs free from mud holes.
2. Providing clean water.
3. Frequent and regular cleaning and disinfecting.
4. Providing dry, clean, and draught-free quarters.
5. Feeding proper rations.
6. Grazing pigs on clean pasture.

SLOPING WALL OVER PIG FEEDING TROUGHS.

Following the recent publication in the Journal of an illustration and description of a swinging door arrangement for facilitating the filling of pig troughs, the Kingston Pig Farm Company has sent in an illustration of a sloping wall arrangement used at its Kingston farm. It is stated that one man has fed 225 pigs in 15 pens with sloping walls

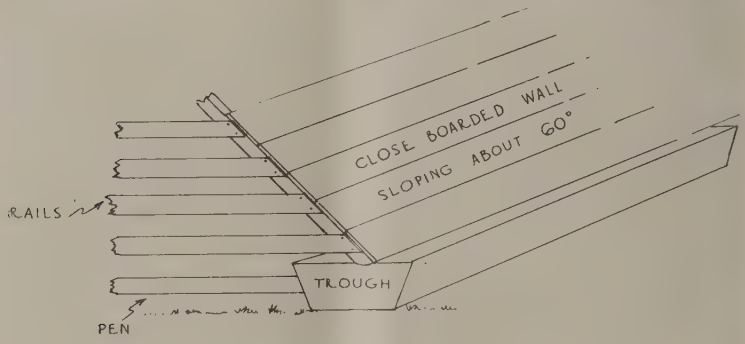

Plate 46.
Illustration of Sloping Wall Arrangement over Pig Feeding Trough.

over the troughs in 12 minutes. For ease in cleaning, it is desirable to have a solid sheet of plain galvanized iron or fibro cement nailed to the sloping wall. Besides possessing the advantage of permitting rapid feeding, the sloping wall prevents a pig jumping into the trough and also protects the trough side of the pen from damage caused by pigs jumping on it.

PREVENTING PIGS FROM DESTROYING PASTURE

One of the most experienced pig farmers in Queensland stated recently that snipping a wide V off the top of the gristly ring at the point of a pig's snout had proved successful in controlling the habit of rooting up and destroying the pasture, but it needs to be cut deep enough so that it will not grow again and so that the pig is unable to use his snout to root up fencing, board floors, and to plough big holes in the ground.

When the nose is treated this way at weaning time, pigs do not develop the habit of rooting to anything like the same extent as would happen otherwise. Older pigs will often use their lower jaw and teeth to root up succulent herbage where the soil is soft after rain, but snipping the gristly ring of young pigs will assist considerably in preventing the destruction of pastures.

Even for a large herd, nose rings are impracticable and are not a success and consequently are not recommended, although it has been observed that a ring in the nose appears to control rooting. However, where wire fencing is used, pigs will tear the ring out and thus defeat the object of ringing. Someone has said, "a good feed is the best fence" and pigs fed balanced rations do not root to anything like the same extent as those seeking mineral matter in the soil.—E. J. Shelton.

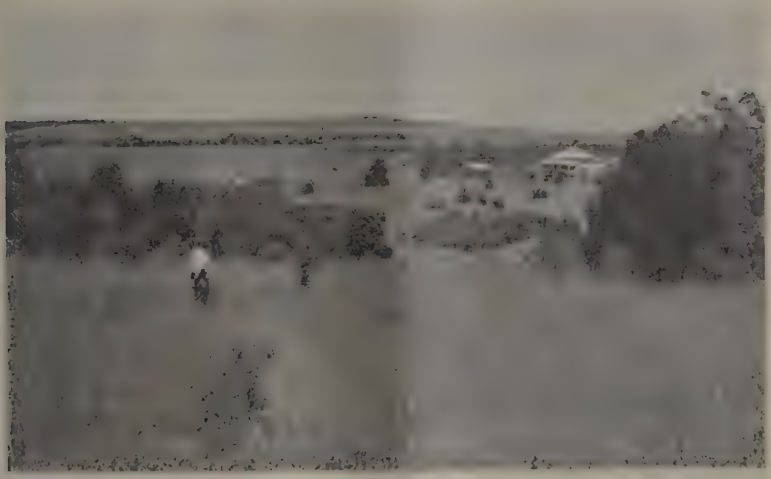

Plate 47.
On a Coolabunia Farm, near Kingaroy.

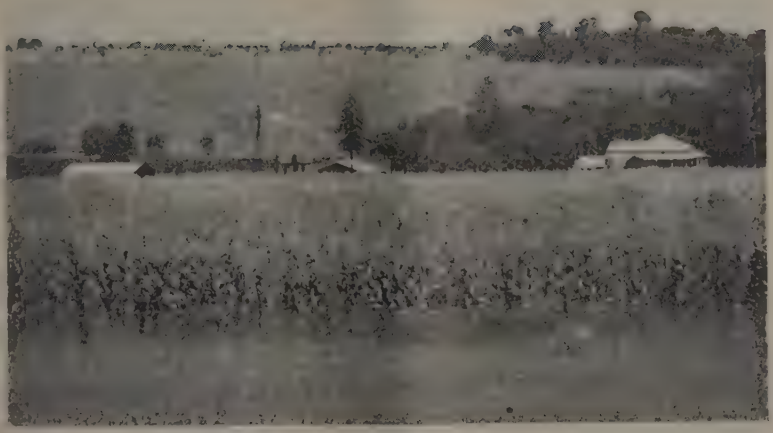

Plate 48.
Maize and Pasture near Wooroolin, South Burnett.

REGISTERED HATCHERIES

REGISTRATION of poultry hatcheries entails the blood testing of the poultry and the removal of birds found to be affected with pullorum disease, or are otherwise unsuitable for breeding purposes.

Hatchery owners who have applied for the registration or the removal of the registration of their hatcheries are listed hereunder:—

Owner.	Name of Hatchery.	Breeds.
N. W. Alfredson, Geebung street, Geebung	Selby	Australorps
V. H. Allen, Oxley road, Oxley	Alaura	White Leghorns, Australorps, Langshans, Rhode Island Reds
I. M. Armstrong, Randall road, Wynnum West	Chanticler	Australorps
A. J. Barnes, Handford road, Zillmere	Zillmere	White Leghorns, Australorps, and Langshans
J. S. Bauer, Oakwood, Bundaberg	Triangle	Australorps and White Leghorns
C. and M. Birney, Archerfield road, Darra	Evenley	White Leghorns and Australorps
R. H. Bowles, Glenmore road, North Rockhampton	Glen Stud	White Leghorns and Australorps
C. W. Bowtell, 4 Payne street, Toowoomba	Downs	Australorps and White Leghorns
John Bowtell, North street, Wilsonton, Toowoomba	Downs	White Leghorns, Brown Leghorns and Australorps
E. J. Brazier, 109 Bridge street, Toowoomba	Miamba	Australorps and White Leghorns
H. Brazil, Beaudesert road, Eight Mile Plains	Brazil's	Australorps and White Leghorns
C. M. Bryce, Postal street, Oxley	Celny	Australorps, White Leghorns, Rhode Island Reds, Welsummer, and Minorcas
Percy J. C. Bygrave, Box 24, P.O., South Brisbane	Craigan Farm	White Leghorns and Australorps
J. Cameron, Oxley Central	Cameron's	Australorps and White Leghorns
W. Carr and **A. B.** and **A. T. M. Watson**, Logan and Creek roads, Mount Gravatt	Bellview Stud	Australorps and White Leghorns
J. L. Carrick and Son, Manly road, Tingalpa	Craigard	White Leghorns and Australorps
A. R. Chard, Chard's road, Bundaberg	Sunnyland	Australorps, White and Brown Leghorns
N. Cooper, Zillmere road, Zillmere	Graceville	White Leghorns
R. B. Corbett, Woombye	Labrena	White Leghorns and Australorps
Alfred Cowley, The Gap, Ashgrove	Melody	White Leghorns
C. M. Cullinane, Upper Mount Gravatt	Rushoin	White Wyandottes and Australorps
V. R. Dearling, 85 Holberton street, Toowoomba	Downs	White Leghorns, Australorps, and Brown Leghorns
E. Eckert, Head street, Laidley	Laidley	Australorps, Langshans, and White Leghorns
Elks and Sudlow, Beerwah	Woodlands	White Leghorns and Australorps
F. G. Ellis, Old Stanthorpe road, Warwick	Sunny Corner	Australorps
W. Ellison, junr., Bald Knob, Landsborough	Willeden	White Leghorns
C. Erbacher, 75 Ramsay street, Toowoomba	Rhode Island Red	Australorps
L. D. Fraser, 69 Ramsay street, Toowoomba	Downs	Australorps
W. H. Gibson, Manly road, Tingalpa	Gibson's	White Leghorns and Australorps
Gisler Bros., Wynnum road, Wynnum	Gisler Bros.	White Leghorns and Australorps
H. J. Greer, Church road, Zillmere	Iona	White Leghorns and Australorps
W. G. Gregory, Deeragun, Ingham Line	Rocks Stud	White Leghorns, Australorps, and Rhode Island Reds
F. P. Grillmeier, Milman	Mountain View	Minorcas and Australorps
T. A. Haggquist, Edmonton	White Rocks	
G. Hall, Kin Kin	Kin Kin	Australorps
P. Haseman, Stanley terrace, Taringa	Black and White	White Leghorns and Australorps
F. E. Hills, Sims road, Bundaberg	Littlemore	Rhode Island Red, Australorps White Leghorns, White Wyandottes, and Langshans
A. E. Hoopert, 24 Greenwattle street, Toowoomba	Kensingson Stud	Australorps and Rhode Island Reds
H. Hufschmid, Ellison road, Geebung	Meadowbank	White Leghorn, Brown Leghorns, Minorca, Australorps, and Rhode Island Reds
E. C. Knoblauch, Mount Gravatt	Lucinda Park	White Leghorns, Australorps, and Anconas
E. C. Kolberg, Handford road, Zillmere	Gerbera	Australorps
W. A. Lehfeldt, Kalapa	Lehfeldt's Australorp	Australorps

REGISTERED HATCHERIES—*continued.*

Owner.	Name of Hatchery.	Breeds.
W. A. Luke, 108 Russell street, Toowoomba ..	Downs	White Leghorns, Brown Leghorns, Australorps, and Rhode Island Reds
J. McCulloch, Whites road, Manly	Hindes Stud ..	White Leghorns, Brown Leghorns, and Australorps
W. S. MacDonald, Babinda	Redbird	Rhode Island Reds and Anconas
A. Malvine, Waterworks road, The Gap, Ashgrove	Alva	Australorps and White Leghorns
H. L. Marshall, Kenmore	Stonehenge ..	White Leghorns and Australorps
W. J. Martin, Pullenvale	Pennington	Australorps, White and Black Leghorns
A. Mawhinney, Robinson road, Aspley ..	Aspley	White Leghorns, Australorps, and Rhode Island Reds
C. Mengel, New Lindum road, Wynnum West..	Mengel's	Australorps
D. G. Miller, Nerimbera, via Lakes Creek ..	Nerimbera	White Leghorns
E. C. Moore, Hyde road, Yeronga	Yeronga	Australorps and White Leghorns
C. J. Nielsen, Kensington street, Bundaberg ..	Bona Vista ..	Australorps, White Leghorns, and Rhode Island Reds
S. V. Norup, Beaudesert road, Cooper's Plains	Norup's	White Leghorns and Australorps
H. Obst and Sons, Shepperd	Collegeholme ..	White Leghorns and Rhode Island Reds
A. C. Pearce, Marlborough	Marlborough ..	Australorps, Rhode Island Reds, Light Sussex, White Wyandottes, Langshans, Khaki Campbell Ducks, Indian Runner Ducks, and Bronze Turkeys
P. A. Pearce, Paynes road, The Gap, Ashgrove	Berea	White Leghorns, Australorps, and Rhode Island Reds
W. J. Perkins, 110 Neil street, Toowoomba ..	Rhode Island Red ..	Rhode Island Reds
G. Pitt, Box 132, Bundaberg	Pitt Poultry Breeding Farms	White Wyandottes, White Leghorns, Brown Leghorns, Australorps, Rhode Island Reds, Langshans, and Light Sussex
J. C. and **G. E. Raff,** Musgrave road, Sunnybank	Brundholme ..	White Leghorns, Australorps, and Rhode Island Reds
G. R. Rawson and Son, Upper Mount Gravatt..	Rawsons'	Australorps
J. Richards, P.O., Atherton	Mountain View ..	Leghorns and Australorps
J. Rogoff, Woodridge	Kingston road ..	Australorps
C. L. Schlencker, Handford road, Zillmere ..	Windyridge ..	White Leghorns
S. E. Searle, New Cleveland road, Tingalpa ..	Tingalpa Stud ..	White Leghorns and Australorps
N. G. Seymour, Palm Avenue, Sandgate ..	Sohufa	Australorps, Black Leghorns, and White Leghorns
J. Schumann, 291 Bridge street, Toowoomba	Downs	White Leghorns, Brown Leghorns, Rhode Island Reds, and Australorps
W. B. Slawson, Mitchelton	Kupidabin	White Leghorns, Australorps, and Light Sussex
T. Smith, Isis Junction	Fairview	White Leghorns and Australorps
H. A. Springall, Progress street, Tingalpa ..	Springfield	White Leghorns
A. Stehn and Son, 285 West street, Toowoomba	Red Spot	Australorps, Rhode Island Reds, White Leghorns, and Brown Leghorns
R. Stockman, Kairi	Tinaroo	White Leghorns and Rhode Island Reds
R. Taylor and **H. Cuerel,** 370 Montague road, Hill End	Bel-Air	Australorps and White Leghorns
E. G. Thorpe, Box 36, Goomeri	Thorburn Electric ..	White Leghorns, Australorps, and Rhode Island Reds
W. J. B. Tonkin, Parkhurst, North Rockhampton	Tonkins'	White Leghorns, Australorps, and Rhode Island Reds
J. R. Twigg, Crown street, Geebung	Piccadilly	White Leghorns, Australorps, and Langshans
G. A. C. Weaver, Herberton road, Atherton ..	Weavers'	Australorps, White and Brown Leghorns, Anconas, Minorcas, Rhode Island Red, Indian Game, and Bantam
F. H. J. Weeks, Bajool	Glen Brae	White Leghorns and Australorps
Mrs. V. M. White, Archerfield road, Darra ..	Viola	White Leghorns and Australorps
Mrs. L. M. Wooller, Huet street, Rockhampton	Riverview	White Leghorns and Australorps
E. M. Winter, 5 Rose street, Toowoomba ..	Downs	White Leghorns
P. A. Wright, Laidley	Chillowdeane ..	White Leghorns, Brown Leghorns, and Australorps

GADGETS AND WRINKLES

POWER POST HOLE DIGGER.

This power post hole digger can be rigged up from parts salvaged from discarded farm machinery. The bevel gears and top sprockets are from an old grain binder. Bearings in which the square shaft turns are of the type used on grain

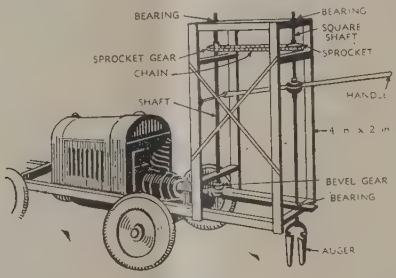

Plate 49.

drills, or boxing and spools from a disc harrow can be used. The square shaft must extend out of the top bearing from three to four feet when the auger is in a raised position, the exact amount depending on the depth post holes desired. The size of the frame work can be varied according to the material at hand. A power driven digger, such as this, is not only a handy thing to have around, but it offers the wide-awake farm mechanic a chance to construct a machine at low cost that has money-making possibilities.

HOW TO MAKE A SLEAKER.

Enquiries concerning the making of a sleaker, or slicker, are often received from farmers wishing to tan skins of various types. The tool is illustrated in the accompanying drawing and can be easily made on the farm. The handle is shaped from a piece of wood and a sawcut made along the top edge. Into the sawcut is

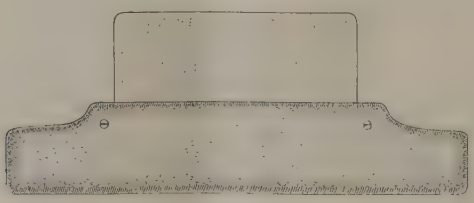

Plate 50.

neatly fitted a piece of steel, 6 inches by 3 inches cut from an old crosscut saw. Two brass screws placed as shown in the drawing will keep the steel plate in position. The screws should be of brass, otherwise staining of the skins may occur. A sharp square edge—not a knife edge—should be kept on the tool.

H. G. BEVAN.

Rural Topics

Sawdust Concrete for the Piggery.

Suitable floors in the pigs' sleeping quarters is often a bugbear to the pig raiser. Sanitation is essential and so is warmth when winter westerlies are blowing or when nights are frosty. While ordinary concrete is best for pig camping quarters from a sanitary point of view, it is much too cold especially for the farrowing sow and her litter. In New Zealand concrete made with sawdust has, seemingly, solved the problem of providing comfort for camping pigs. After some years of use it is claimed for sawdust concrete that it is healthier, more durable, drier and warmer than gratings or false floor boards.

Here is the recommended method of mixing sawdust concrete:—

The sawdust concrete mixture is laid on top of an ordinary concrete floor, in the sleeping quarters only. Three parts of sawdust to one of cement by measure are the quantities recommended. For an area 8 feet by 8 feet and 2 inches thick, three bags of cement are required. The sawdust should be coarse, dust from a breakdown saw being the most suitable. The mixing should be done by hand and worked thoroughly to a good moist consistency. The most satisfactory way of doing the job is to start at the back of the sleeping quarters to a width which can be worked comfortably with a wooden float. Sawdust concrete should be applied in ½-inch layers and worked well in until the required 2-inch level is reached. A dusting of pure cement is then applied to the surface and smoothed over with a float. Finally, the floor is dusted over with clean sand. This gives a waterproof covering on the gripping sawdust concrete surface.

It is advisable to lay a ledge 4 inches wide of ordinary concrete in the doorway leading into the pens to prevent the sawdust concrete breaking away. The floor should be given three weeks to harden before being used.

Horse Feeding Rules.

Most derangements of the digestive organs of horses are due to errors in diet, and a good and regular system of feeding will do more to prevent digestive disease than anything else that can be suggested. The following rules for feeding are generally accepted as correct:—

1. Preferably water before feeding.
2. Feed in small quantities, and often.
3. Do not work hard immediately after a full feed.
4. Never give a horse food to which it is not accustomed in large quantities.

If the above rules are followed, and care taken to ensure that only sound, good feed is fed, very little trouble will be experienced.

Agricultural Arithmetic.

When any branch of farming is unusually profitable, a general tendency often develops towards the inflation of land values. False values often tempt us to buy properties at ridiculous prices, thus starting with an overload of interest. Overvalued land raises the cost of running a farm in every operation. The arithmetic of profits never varies; it's as constant as the coming of night and day. The man whose land costs him £25 a cow, and whose herd produces 300 lb. of butter fat a cow, can produce butter fat at an average land cost of not much more than 1d. a lb., but the man whose land cost him £100 a cow, and whose herd only produces 125 lb. of fat a cow has to face a cost of 1s. 0½d. for every pound of butter he produces.

The man who has paid too much for his land—that is, at an uneconomic price—and who hasn't built up an economic level of production per cow, or who in the past hasn't kept the feed up to his cows so that they could produce up to their inherited capacity, has had a wartime opportunity of correcting his mistakes. The value of land is in what it can produce, not in figures tied to a balloon.

"Breaking In" Young Horses.

Horse "breaking" is a bad term, as the animal's spirit is not to be broken, observes T. G. Hungerford, in an article on the breaking, training, and handling of horses in the *Agricultural Gazette* of New South Wales. In ideal "breaking" the normal horse is trained for his life's work without any severe tussle of will, his reactions being carefully watched as the instruction moves quietly from point to point. The animal's fear is allayed, and only cantankerous, flighty, or timid animals rebel.

As an example of what can be done by a first-class "breaker," the case is quoted of the handling of a line of young riding horses, including some thoroughbreds, at Boggabilla in 1941. Not one of these animals bucked or "pigrooted" during their training, and they were turned out for use "bridle wise," with some skill in handling cattle, under a fortnight.

No two colts are alike, and each youngster must be treated as an individual.

A horse acts instinctively, but this is conditioned by habit, and by memory of previous treatment. The difficulty is to make the colt understand what is wanted. Training is based on reward and punishment, any act of obedience being rewarded by petting or fondling, and disobedience by carefully graded punishment. Care must be taken, however, not to confuse disobedience with the horse's instinctive reactions to fright or pain. The highly strung horse must be handled gently, the sluggish drone, sharply. In every case the confidence of the horse should be gained.

To put a horse at any task which is too difficult, or too heavy, is to encourage him to become a "jib." If the breaker loses his temper, all further work with the horse should be discontinued at once. Never work a colt after he is tired. Always work at breaking in a quiet secluded place where the colt can concentrate his attention unhindered on the breaker. Always attract the horse's attention before approaching.

If more than one person is working on the horse close up, it is safer, and better, for both to be on the one side.

Man and Animal—Sympathy, Not Sentiment.

As care for the welfare of our stock increases, so also does our satisfaction with the job we've taken on. Money doesn't come into the question at all. This satisfaction is worth something far more than cash, and can't be bought. After all, farm animals should never be compared with machines. There's only one standard to use for animal comfort and that's a personal one. We have to put ourselves in the animals' place under each set of conditions and consider whether they would be comfortable for us too. Most stockowners are sincerely anxious to do everything possible, or practicable, at the time, for the comfort of their flocks and herds. Some, however, may not be inclined to think too hard about such matters as salt in the paddocks, or rugs for dairy cows and working horses in cold weather.

Apart from making stock comfortable in the paddock or in the yard, there is a return worth having in the increased confidence animals have in the man who looks after them. Any horse trainer will confirm that. There should always be a sympathetic bond—not a sentimental one—between man and animal.

Take paddocks—when fenced we say with a flourish of the sweat rag: "Thank goodness, the stock are secure now." So they are, but secure from what? It's all too easy to forget that when we let stock go in a paddock from that moment we completely control their existence. No longer can they look for a belt of dense scrub to shelter from the summer sun or to camp in on frosty nights, unless we have been wise enough to provide for them beforehand. It is surely up to us to provide for all emergencies, so that our stock can have the most comfortable conditions of living possible in all the circumstances. Trees for shade and shelter should be provided on every farm.

Orchard Lay-out.

Laying out an orchard on a slope should not commence until the question "Can this area be contour planted?" has been properly answered. Contour planting pays two kinds of dividends. Fast falling rains move off slowly along the contours and soak in; this dividend is an annual one and commences soon after the trees are planted. The second dividend starts early and the rate of payment increases as the years go on. On the square-planted, sloping orchard, which is unprotected, fertility goes downhill with the soil at an ever-increasing rate. Contour planting, and banking where necessary, preserve the asset; the best of the top-soil stays around the trees instead of piling up on the bottom fence. No great amount of technical skill is required to lay out an orchard for contour planting.

Mother and Child.

Under this heading an article supplied by the Maternal and Child Welfare Service of the Department of Health and Home Affairs, dealing with the welfare and care of mother and child, is published each month.

POSTURE—ITS IMPORTANCE IN INFANCY AND CHILDHOOD

(Part 2).

FOLLOWING on from last month's article on the necessary care of the infant to ensure good posture, some of the causes of faulty posture in the growing child may be discussed, but before doing so, it will be an advantage to consider the correct posture on sitting and standing so that parents may decide whether their children are developing satisfactorily.

In the correct standing posture, the head is up with the chin drawn in and backward, the chest is raised, the breast bone being the point farthest forward, and the rib spaces widened. The lower abdomen is flat and drawn in and the knees are held straight but without strain. The back is almost straight. The correctness or otherwise of the child's standing position may be tested by dropping a line from the level of the ear. This should cross the middle of the tip of the shoulder, touch the middle of the hip, pass through the knees and touch the floor opposite the most prominent part of the outer side of the foot. In a correct sitting posture, the upper part of the body is erect or leaned slightly forward and the shoulders are on a level. The body is bent only at the hips and knees, while the head, neck and trunk should be kept in one straight line. The lower part of the back and buttocks should rest squarely against the lower part of the back of the seat. The feet should rest squarely on the floor. If the chair is too high a small box should be provided as a foot rest.

Causes and Prevention of Faulty Posture.

Children often take wrong postures, especially while reading, writing or resting at their desks. Children at home and in school or kindergarten should be provided with posture chairs and desks which are made so that the seat is deep enough to support the whole thigh and come rather close to the knees. They should have a slight backward slope. Sister at your Welfare Centre or Toddlers' Health Centre will tell you about them.

Poor eyesight is a common cause of faulty posture. The child who cannot see well stretches his head forward to try and follow what his teacher is showing or writing on the blackboard. If the head is in a bad position, the same is true of the chest and shoulders, trunk and back. Parents must realise the importance of having their children's eyes cared for and corrected with glasses if necessary.

Malnutrition is another common cause of faulty posture. This generally arises from (*a*) wrong health habits such as not getting enough rest or sleep, exercise and play, fresh air and sunshine; or (*b*) wrong food or not enough food. The slender, lanky, rather highly-strung child is most apt to have faulty posture and needs special care and dieting.

Carrying heavy books to and from school may be a cause of faulty posture. Weight carrying is bad for growing children and should be avoided as far as possible. The satchel with alternate shoulder straps such as hikers use should be provided for the child who walks or rides to school.

Children who have been very ill may adopt wrong postures from weakness if they get about too soon. No child who has been ill should return to his usual routine until he has regained his normal weight.

Badly shaped clothing is among the remaining causes of faulty posture.

Pride in Good Health.

Children should be taught the importance of good posture and parents and teachers should instil into them a pride in good health, good appearance, and an upright carriage. It should be explained to children that correct posture helps them to work and play day in and day out without becoming overtired. It is a good plan to liken their bodies to a watch, and explain that if the case is bent, the bits of machinery are thrown out of their right position and the watch does not keep good time. So it is with the growing child. If the bony framework is not well-built and is out of place, some of the organs of the body will be crowded out of their natural position and cannot do their work properly.

Poor posture by bringing needless strain on the muscles and ligaments may cause headache or pains in the head, abdomen, chest and limbs. This may be wrongly charged to rheumatism.

Exercises for the correction of faulty posture will be supplied and questions on this or any other subject concerning Maternal and Child Welfare will be answered by communicating personally with the *Maternal and Child Welfare Information Bureau,* 184 St. Paul's Terrace, Brisbane, or by addressing letters *"Baby Clinic, Brisbane."* These letters need not be stamped.

IN THE FARM KITCHEN.

Potato Nut Cakes.

1½ lb. potatoes.
2 heaped tablespoons chopped peanuts.
1 dessertspoon peanut butter.
Celery salt, salt, pepper.
1 egg beaten.

Wash the potatoes and steam or bake them dry in their jackets. Remove the peel and mash the potato with the peanuts and peanut butter. Season with salt, pepper, and a pinch of celery salt. Beat the potato thoroughly and then add the beaten egg and beat again. Put out rough spoonfuls on a buttered scone tray and place in a good moderate oven. Bake for about twenty minutes till lightly browned. Serve with any suitable entree. They are delicious with grills.

Spring Onion Fritters.

About 1 lb. spring onions or very small white onions.
2 oz. flour.
Pinch salt.
Bare ¼-cup warm water.
1 dessertspoon salad oil or melted butter.
1 egg white.

Sift the flour and salt into a bowl. Make a well in the centre. Pour the water in gradually, stirring round and round in the centre and add the oil in the same way till all the flour is incorporated. Beat thoroughly and allow to stand for an hour at least. Just before using, whip the egg white to a stiff froth and fold into the mixture. While the batter is standing prepare the onions, and either steam over boiling water or cook in a little boiling water, with the pan tightly covered, till just soft. They must not be broken or mushy. Drain thoroughly.

Have ready a deep pan of fat. When boiling and a faint, bluish smoke rising from it, put two or three onions into the batter. Coat well and lift them out, allowing superfluous batter to drip off. Then put carefully into the fat and fry till crips and lightly browned. Drain on crumpled paper and keep hot. Coat and fry another batch in the same way, but do not attempt to fry too many at one time and be sure the fat is boiling each time.

Plate 51.
A Farm Home in the South Burnett.—Mr. L. V. Young's property near Wooroolin.

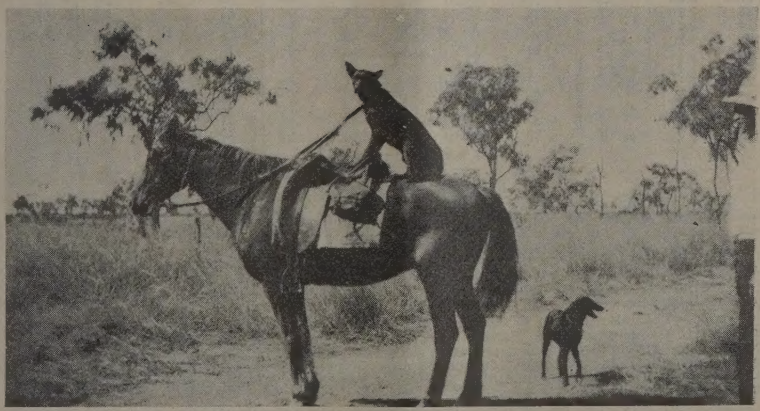

Plate 52.
Cobbers.—On the road at Launceston, near Prairie, North Queensland.

ASTRONOMICAL DATA FOR QUEENSLAND.

SEPTEMBER.

Supplied by the Astronomical Society of Queensland.

TIMES OF SUNRISE AND SUNSET.

At Brisbane.			MINUTES LATER THAN BRISBANE AT OTHER PLACES.					
Date.	Rise.	Set.	Place.	Rise.	Set.	Place.	Rise.	Set.
	a.m.	p.m.						
1	6.03	5.33	Cairns	26	32	Longreach	34	36
6	5.58	5.36	Charleville	27	27	Quilpie	35	35
11	5.52	5.38	Cloncurry	48	52	Rockhampton ..	9	11
16	5.46	5.40	Cunnamulla ..	29	29	Roma	17	17
21	5.40	5.42	Dirranbandi ..	19	19	Townsville	22	27
26	5.35	5.45	Emerald	18	20	Winton	38	42
30	5.30	5.46	Hughenden ..	33	37	Warwick	4	4

TIMES OF MOONRISE AND MOONSET.

At Brisbane.		
Date.	Rise.	Set.
	a.m.	p.m.
1	1.48	12.30
2	2.47	1.26
3	3.41	2.24
4	4.29	3.22
5	5.12	4.20
6	5.51	5.16
7	6.26	6.10
8	6.58	7.03
9	7.30	7.55
10	8.00	8.46
11	8.32	9.38
12	9.05	10.31
13	9.40	11.24
14	10.20	..
		a.m.
15	11.04	12.19
16	11.54	1.13
	p.m.	
17	12.49	2.07
18	1.48	2.59
19	2.51	3.48
20	3.56	4.34
21	5.03	5.17
22	6.09	5.58
23	7.16	6.37
24	8.23	7.18
25	9.30	8.00
26	10.37	8.45
27	11.41	9.33
28	..	10.25
	a.m.	
29	12.42	11.21
		p.m.
30	1.38	12.18

MINUTES LATER THAN BRISBANE (SOUTHERN DISTRICTS).

Charleville 27; Cunnamulla 29; Dirranbandi 19;
Quilpie 35; Roma 17; Warwick 4.

MINUTES LATER THAN BRISBANE (CENTRAL DISTRICTS).

Date.	Emerald.		Longreach.		Rockhampton.		Winton.	
	Rise.	Set.	Rise.	Set.	Rise.	Set.	Rise.	Set.
1	11	28	26	43	1	19	29	52
6	14	24	29	40	4	15	33	46
11	23	14	39	30	14	5	45	34
16	28	11	44	26	19	1	52	29
21	22	15	38	30	13	6	44	35
26	13	25	28	41	2	17	31	49
30	11	28	26	43	1	19	29	52

MINUTES LATER THAN BRISBANE (NORTHERN DISTRICTS).

Date.	Cairns.		Cloncurry.		Hughenden.		Townsville.	
	Rise.	Set.	Rise.	Set.	Rise.	Set.	Rise.	Set.
1	7	50	36	63	21	49	8	42
3	7	49	36	63	21	49	8	41
5	12	43	39	59	24	45	12	36
7	19	35	44	55	29	40	18	30
9	29	26	50	47	35	33	25	22
11	38	17	56	43	41	27	32	17
13	45	10	61	38	45	23	37	11
15	50	7	64	36	48	21	41	8
17	51	6	65	35	49	21	42	8
19	46	9	61	37	46	23	37	10
21	36	18	55	43	40	28	30	17
23	25	30	47	50	32	35	22	25
25	14	40	41	57	26	42	14	34
27	8	48	37	62	21	48	8	40
30	7	50	36	63	21	49	8	42

PHASES OF THE MOON.

New Moon September 6th, 23h. 43m.; First Quarter September 15th, 03h. 38m.; Full Moon September 22nd, 06h. 46m.; Last Quarter September 28th, 21h. 24m.

DISCUSSION.

September 23rd will be the date of the Spring Equinox (Southern Hemisphere), and on this day the Sun will rise and set true east and true west respectively.

On September 9th the Moon will rise approximately true east and on 23rd will set approximately true west.

Venus.—This planet, still a brilliant object in the morning sky, at the beginning of the month, in the constellation of Cancer, will rise, in Queensland generally, between 4 a.m. and 4.30 a.m., about 20 degrees north of true east. About the middle of the month it passes into the constellation of Leo, and on the 23rd it passes very close to Regulus. At the end of the month Venus will rise, generally, between 4 a.m. and 4.45 a.m. about 12 degrees north of true east.

Mars.—Mars, at the beginning of the month, in the constellation of Taurus, will rise between 1.30 a.m. and 2 a.m., about 25 degrees north of true east. Early in the month it enters the constellation of Gemini, and by the end of the month it will rise between 1 a.m. and 1.45 a.m. about 25 degrees north of true east.

Jupiter.—Early in the month Jupiter may be seen low in the west during evening twilight, when it sets between 7.15 p.m. and 8.15 p.m., almost true west. Before the end of the month it will be too close in line with the Sun for observation.

Saturn.—Saturn at the beginning of the month will rise between 3.15 a.m. and 4 a.m. about 23 degrees north of true east. At the end of the month, still in the constellation of Gemini, this planet will rise about midnight, 23 degrees north of true east.

QUEENSLAND WEATHER IN JULY.

In all divisions, except the southern Peninsula, aggregate district rainfalls were well above normal, mainly as the result of widespread and valuable falls, between the 10th and 12th, generated by an out-of-season movement of warm tropical air from the north of Australia. Most districts averaged from well over an inch to approximately three inches, the best served areas being the Central Interior, Central Highlands to the Central Coast and South Coastal Divisions. Central Coast pastoral and agricultural areas needed the rain to counteract previous dry conditions, while the mainly good seasonal prospects in dairying and farming divisions of the south-east quarter should be maintained. Frost on the Downs checked prolific crop growth.

Central pastoral areas received most benefit, but average rains of approximately 1½ inches in the dry lower west and southern interior border were patchy and stock losses resulted from the succeeding cold spell. In these areas another early recuperative soaking rain with warmer conditions is needd.

Temperatures.—Maximum temperatures ranged from approximately normal at Longreach and Thargomindah to 2.9 degrees below at Boulia and Mitchell and 4.3 degrees below at Palmerville. Minimum temperatures were also 3 degrees below at Palmerville, otherwise slightly above normal to 2.9 degrees at Longreach. Many sharp frosts inland were recorded, particularly on the 1st to 8th and 16th to 24th. In the later period stock losses in drier southern districts followed the mid-month rains. On the 16th, 17th, and 18th frosts occurred at Herberton, with minimum temperatures of 27 degrees (screen) and 22 degrees (grass). Other low readings were:—Mitchell 25/18 degrees (8th), 25/20 degrees (22nd), Tambo 30/22 degrees (22nd), Stanthorpe 24/18 degrees (8th), 26/20 degrees (25th). Bleak conditions (Sunday, 15th) in Southern Divisions. Maximum readings:—Brisbane 52.8 degrees, Stanthorpe 48 degrees, Warwick 49 degrees (with sleet), 53 degrees and 54 degrees most Maranoa and South-west stations.

The rain position is summarised below:—

Division.	Normal Mean.	Mean July, 1945.	Departure from Normal.
	Points.	Points.	Per cent.
Peninsula North	42	53	26 above
Peninsula South	24	..	100 below
Lower Carpentaria	20	29	45 above
Upper Carpentaria	42	47	12 ,,
North Coast, Barron	114	184	61 ,,
North Coast, Herbert	179	213	19 ,,
Central Coast, East	111	316	185 ,,
Central Coast, West	65	115	77 ,,
Central Highlands	116	269	132 ,,
Central Lowlands	82	201	145 ,,
Upper Western	41	71	73 ,,
Lower Western	51	155	204 ,,
South Coast, Port Curtis	178	388	118 ,,
South Coast, Moreton	227	324	43 ,,
Darling Downs East	181	186	3 ,,
Darling Downs West	141	145	3 ,,
Maranoa	147	196	33 ,,
Warrego	107	161	50 ,,
Far South-West	69	161	133 ,,

Commonwealth of Australia Meteorological Bureau, Brisbane.

ANOTHER FIELD FOR FARMERS' CO-OPERATION.

More efficient food production during the war and a more prosperous rural economy after the war have been greatly facilitated by the electrification of nearly 2,000,000 American farms since the United States Electrification Administration was established.

The latest survey shows approximately 2,700,000 farms, or nearly half of all the farms in the United States, are now wired for electric service. About two-thirds of those connected since 1939 are financed by the Administration. Funds have been loaned principally to member-owned co-operatives. Because co-operative rural electric systems are run primarily by and for farmers, they have been able to provide effective local leadership in a nation-wide campaign to encourage utilisation of farm power in productive operations, with highly gratifying results in terms of increased production and saving of labour.

A proposal for establishment of an international co-operative office in the Social and Economic Council of the proposed World Security Organisation was submitted to delegates at the recent United Nations' Conference at San Francisco by the United States Co-operative League. The plan calls for an agency equal in status to the United Nations' Interim Commission on Food and Agriculture, the International Labour Organisation, the proposed World Bank and Monetary Fund, and other similar agencies. The international co-operative office would collect and disseminate information about co-operatives of all types throughout the world, and would propose measures suitable for the promotion of free exchange and services among the nations.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

JUNE RAINFALL.

(Compiled from Telegraphic Reports).

Divisions and Stations.	Average Rainfall.		Total Rainfall.		Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	June.	No. of years' records.	June, 1944.	June, 1945.		June.	No. of years' records.	June, 1944.	June, 1945.
North Coast.	In.		In.	In.	*South Coast—contd.*	In.		In.	In.
Atherton	1·73	42	4·20	1·40	Gatton College ..	1·72	44	0·62	4·42
Cairns	2·89	61	5 22	2·15	Gayndah	1·82	72	0·46	1·08
Cardwell	2·09	71	4·05	1·32	Gympie	2·60	73	1·72	3·83
Cooktown	2·09	67	3·42	0·87	Kilkivan	2·14	62	0·85	1·73
Herberton	1·18	57	2·55	0·74	Maryborough ..	2·93	72	2·13	2·66
Ingham	2·49	51	3·44	3·52	Nambour	3·69	47	3·30	9·06
Innisfail	7·41	62	15·73	3·68	Nanango	1·95	61	1·04	2·57
Mossman	2·97	19	4·80	1·51	Rockhampton ..	2·51	72	0·91	1·78
Townsville	1·38	72	0·46	2·97	Woodford	2·78	55	1·72	5·26
Central Coast.					*Central Highlands.*				
Ayr	1·48	56	0·56	3·40	Clermont	1·68	72	0·50	3·60
Bowen	1·64	72	0·94	2·70	Springsure	1·76	74	0·62	4·51
Charters Towers ..	1·31	61	0·42	1·02					
Mackay	2·74	72	2·90	4·24	*Darling Downs.*				
Proserpine	3·22	40	3·26	4·01	Dalby	1·63	73	0·89	2·57
St. Lawrence ..	2·46	72	1·65	2·55	Emu Vale	1·45	47	0·67	6·70
					Jimbour	1·53	64	0·80	1·88
South Coast.					Miles	1·69	58	1·34	1·51
Biggenden	2·16	44	0·55	0·85	Stanthorpe	1·88	70	0·95	6·02
Bundaberg	2·79	60	1·11	1·00	Toowoomba	2·33	71	0·84	5.68
Brisbane Bureau ..	2·58	93	0·90	5·89	Warwick	1·70	78	0·15	5·11
Caboolture	2·74	67	2·27	4·44					
Childers	2·40	48	0·90	1·49	*Maranoa.*				
Crohamhurst	4·29	50	2·67	6·56	Roma	1·49	69	1·47	2·47
Esk	2·14	56	0·52	5·16	St. George	1·49	62	0·85	1·47

CLIMATOLOGICAL TABLE FOR JUNE.

(Compiled from Telegraphic Reports.)

Divisions and Stations.	Atmospheric Pressure. Mean at 9 a.m.	Shade Temperature.		Extremes of Shade Temperature.				Rainfall.	
		Mean Max.	Mean Min.	Max.	Date.	Min.	Date.	Total.	Wet Days.
Coastal.	In.	Deg.	Deg.	Deg.		Deg.		Ins.	
Cairns	..	80	65	83	3	55	28	2·15	12
Herberton	..	72	52	75	13, 14	38	13	0·74	10
Townsville	..	78	61	82	3	51	15, 16	2·97	7
Brisbane	30·05	71	56	83	23	44·0	30	5·89	12
Darling Downs.									
Dalby	..	68	47	77	23	28	29	2·57	8
Stanthorpe	..	62	44	68	3, 22	24	26	6·02	12
Toowoomba	..	63	47	73	23	29	25	5·68	13
Mid-Interior.									
Georgetown	29·91	85	55	89	3, 4	38	13	1·17	4
Longreach	30·11	76	53	87	26	40	29·30	1·41	6
Mitchell	30·11	68	46	79	22	26	29·30	1·86	6
Western.									
Burketown		85	58	90	30	49	13	Nil	Nil
Boulia	30·10	79	50	90	22	42	29	Nil	Nil
Thargomindah	30·10	70	52	86	21, 22	42	29	Nil	Nil

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